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AMERICAN RAILROAD JOURNAL.

NEW-YORK, MAY 28, 1836.

Harlaem Canal.—The original and amended charters of the Harlaem Canal, will be found in the Journal this week. We shall give, at an early date some account of that contemplated work.

To the Editor of the Railroad Journal.

Dear Sir—I noticed not long since a communication in your paper of Feb. 13, 1836, signed S. D., also another in that of April 30th, 1836, signed C. R. W.

These gentlemen appear much at a loss to understand my communication to James G. King, Esq., President of the New York and Erie Railroad Company, which was published in your paper of January 13, 1836, respecting the power of locomotive engines upon Railroads, &c.

I agree with the gentlemen that steep grades are an objection to Roads for the use of locomotive power; and that they should be avoided when it can be done within a reasonable expense. If, in my communication to Mr. King, I stated that greater elevations are surmounted on the Baltimore and Ohio Road, by locomotive steam power, than was formerly thought practicable, it was with a view of showing that greater elevations than has heretofore been deemed possible, could be overcome without resorting to *stationary* power on the New York and Erie Railroad; a fact which must be admitted by all who are familiar with the route, and know the power and performance of *American Locomotives*. Even if S. D., or C. R. W. *have* constructed Railroads upon the plan of level, or slight ascents, and inclined planes, I trust they are willing to admit that a different plan is now deemed, by some of the oldest and ablest Engineers in the country, to be preferable, in certain cases, both as it regards economy in construction, and facility in transportation. If they have not, however, constructed Roads upon the above, or *any other* plan, and—independently of practice—have theory only sufficient to make calculations, they will do well to use much caution in the location of works, upon which they may be hereafter engaged.

C. R. W. desires proof that he is in error. I shall, however, at this time, only request him to examine some of those American Locomotives, on which the power is applied to *four*, instead of *two* wheels, and to go through with his calculations again; when he may, perhaps, entertain views different from those expressed in his late communication. If C. R. W. is disposed to communicate, in a friendly spirit, which is evidently not the case in the article above referred to, I will with pleasure give him my views in detail, and data for them, if necessary. As he appears fond of theory, he may, perhaps, answer the following query, viz. What rate of ascent per mile is preferable, for the use of locomotive steam power, to that of stationary, upon a straight line of Railroad, allowing the transportation to be equal both ways, the cost for construction equal in both cases, the distance the same, and the transportation equal to one half of what the Road is capable, with a good permanent double track, upon a level Road, supposing the Road to be not less than 100 miles in length?

P. S. Would it not be aswell for C. R. W., in his future communications, to transpose the initials of his name.?

Yours respectfully,

James Seymour.

Monticillo, May 26th, 1837.

PAMBOUR ON LOCOMOTION.

Continued from page 314.

CHAPTER II

ARTICLE II.

OF THE MERCURIAL STEAM-GAUGE.

§ 3. *Experiments on the Pressure of Steam in the Locomotive Engines.*

As those experiments serve to illustrate the foregoing principles, as they give the amount of the effect produced by the miter and the additional parts of the valves, and as they, besides, are the foundation of some of the calculations we shall make on the engines, we shall here give an account of some of them.

I. Atlas; valve $2\frac{1}{2}$ inches in diameter; miter $2\frac{3}{4}$ inches, cut with a slant in the middle of the breadth of the valve, as may be seen in fig. 22; levers 3 inches and 15 inches, or in the proportion of 1 to 5; second safety valve similar to the first, but fixed at too high a pressure to blow in any of the experiments.

The engine being brought to the mercurial gauge on the 15th July, 31st July, and

6th August, 1834, gave the corresponding degrees as follows:

	Degrees of the balance:	Corresponding pressure per square inch, by the mercurial guage.
No. I.	0	4
	10	15.25
	11	15.50
	20	25.50
	20.25	25.75
	20.75	26.25
	22.50	27.50
No. II.	20.25	24.75
	20.50	25.25
	22	25.75
	23	26.25
	23.75	27
	25	28.25
	30	33.50
	30.25	34.50
	30.50	35
	33	37.50
	33.25	38
No. III.	51.25	54
	51.50	54.50
	51.75	55
	52	55
	52.50	55.50

In the first series of those experiments the degrees of the balance were taken with the valve resting on its seat, at least as much as possible, that is to say, the valve emitting scarcely any steam. To obtain this, the engine was brought to the gauge when its work was finished, at the moment when the fire diminishing rapidly, the pressure also decreased continually, so that the blowing at the valve became gradually less, and at last ceased almost completely. In proportion as the pressure indicated by the mercurial gauge was diminished, the screw of the balance was loosened, in order that it might continue to show the inferior pressures that were produced.

The degree corresponding to zero on the balance, could not be taken exactly; the balance having already fallen a little below zero when the index marked 4 lbs.

In the second series of experiments the engine was, on the contrary, taken at the moment when the screw of the spring-balance being loosened on purpose, the boiler contained steam at 20 lbs. pressure only. By forceing the fire and tightening by degrees the screw of the balance, the above-marked degrees were produced, and the corresponding numbers of the steam-gauge inscribed. We have seen, that in the first series all the degrees were taken with the valve resting on its seat. Here, on the contrary, the pressure, augmenting rapidly in the boiler, raised continually the valve, so that all the degrees were taken with a blowing-valve. However, as the screw of the balance was tightened in proportion as the pressure increased, the blowing was never very considerable, and scarcely ever showed above 1 or 2 lbs. on the spring-balance.

In the third series, the engine was in its usual working state; that is to say, the spring-balance marking 50 lbs. when the valve was shut by pressing upon the lever with the hand, and the valve rising beyond that point by the blowing of the steam, as far as the force of the steam was able to push it. As the screw was not tightened in proportion as the pressure augmented, the valve in this last case was raised much higher than in the preceding one.

By examining the first series, we see that, in those experiments, the pressure by the mercural gauge is equal to the pressure marked by the spring-balance, with an addition of 5 lbs.

In the second series, we have only 4 lbs. to add to the degrees of the balance.

And in the third series, only 3 lbs.

Those differences are easily explained by referring to the preceding principles.

The valve-lever of this engine, when weighed at the place of the valve, as explained above, gave $7\frac{1}{2}$ lbs.; the disk of the valve weighed $10\frac{1}{4}$ ounces; which makes for those two objects together 8.14 lbs. weight, directly applied on the valve.

Besides, the tolal weight of the balance was 4 lbs., and turned upside down it marked half a pound, which gives for the weight of the rod and spring

$$\frac{4+1.5}{2}=2.75 \text{ lbs.}$$

This weight of 2.75 lbs., acting at the end of the lever, must be multiplied by the length of the lever. So that the whole addition to be made to the tension marked by the spring, is

$2.75 \times 5 = 13.75$, effect of the rod and spring at the end of the lever.

8.14, weight of the lever and disk of the valve.

Sum 21.89

And as the diameter of the valve is 2 inches, which gives a surface of 4.91 square inches, those 21.89 lbs. divided per unit of surface or square inch, give

$$\frac{21.89}{4.91}=4.46 \text{ lbs.}$$

So that the real pressure surpasses by 4 or 5 lbs. that which results from the spring of the balance.

This result applies to the valve resting on its seat, that is to say, in taking its diameter at $2\frac{1}{2}$ inches, which gives us for its surface in square inches, and consequently for divisor, 4.91; but as, by the effect of the blowing, the effective area of the valve is augmented, we must not be surprised, if, by a moderate blowing, this addition of 5 lbs. be reduced to 4 lbs., and even to 3 lbs. for a valve that blows violently. If, for instance, the calculation is applied to a pressure of 52 lbs. marked at the balance, we shall have

$(52 \times 2.75) \times 5 = 273.75$ Effect of the weight suspended at the end of the lever, including the rod and spring

8.14 lever and valve.

281.89 total pressure.

Which, divided by 4.91 square inches, gives for each 57.41 lbs.

But in reality the corresponding point of the mercurial gauge is only 55 lbs., the blowing must therefore have augmented the real area of the valve to 5.13 square inches instead of 4.91, that is to say, must have brought its real diameter to 2.55 inches, instead of 2.50 inches.

So it is an addition of $\frac{5}{100}$ of an inch to the diameter of a valve of 2.50 inches, that has been sufficient to produce the difference of $2\frac{1}{2}$ lbs. we observe here. That is the effect of the blowing of the valve, which as we see is considerable; and it can only be known by the mercurial gauge, and not by any measures taken on the engine itself.

II. Vesta; valve $2\frac{1}{2}$ inches diameter; lever 3 inches and 36 inches, or in the proportion of 1 to 12. Second valve of the same diameter as the first, with a lever of $2\frac{1}{2}$ inches and 15 inches, or in the proportion of 1 to 6, marking 50 on the balance, and giving issue to the steam at the same time as the first, but so difficult to move, that 5 lbs. more by the mercurial gauge causes no motion in it. This engine brought to the mercurial steam-gauge on July 28, and August 5, 1834, in the same manner as the *Atlas*, gave the following results:—

	Degrees of the spring-balance. lbs.	Corresponding pressure per square inch, by the mercurial gauge. lbs.
No. I.	8.50	24
	9	24.50
	9.50	26
	10	27
	10.25	28
	10.50	29
	10.75	30
	12	31.50
	12.25	32
	12.50	33
	12.75	34
	13.25	35
	13.50	36
	13.75	37
	14	38
No. II.	20	starting point of the valve.
	21	50
	21.25	51
	21.50	52
	22	53.25
	22.25	54
	22.50	55

The experiments of the first series were made as much as possible with the valve resting on its seat; that is to say, that the screw of the spring-balance was tightened in proportion as the pressure augmented, so that there was scarcely any blowing,

For those of the second series, the engine was brought to the mercurial guage in its usual working state, with the spring-balance at 20, when the lever is pressed upon to shut the valve, and the degrees observed are those that result from the blowing of the steam beyond that point; that is to say, that those degrees are taken with a valve rising from degree 20.

The valve lever of this engine being divided in the proportion of 1 to 12, every weight inscribed on the spring-balance produces on the valve a pressure 12 times as great. The surface of the valve is 4.91 square inches. Multiplying therefore the degrees of the balance by 12, and dividing the produce by 4.91, the pressure resulting from the spring, considered by itself, will be obtained. That calculation is generally considered sufficient.

If the results thus obtained be compared with the corresponding degrees of the mercurial guage in the first series of experiments, it will be found that those results rea always below the real pressure by 3 lbs. or 4 lbs.; this must therefore be the effect of the weight cf the additional parts that we are considering.

In fact, the lever of this engine, reduced onpurpose by the constructor, weighs 15 lbs. at the place of the valve. The disk of the valve weighs 10 ounces. The balance is not placed in its usual position; it is turned upside down, so that the lever, instead of supporting the rod of the balance, bears only its foot. The weight of this foot is 0.25lb.; for the whole balance weighs 2 lbs., and when suspended with the rod downwards it marks 15 lbs., which is the surplus of the weight of the rod over the weight of the foot; wherefrom results that the weight of the foot is, as has been said, 0.25 lb.

So that the addition owing to these different objects is

	lbs.
Weight of the lever and disk of the valve	15.60
Effect of the foot suspended to the lever 0.25 lb $\times$ 12	3.00
Sum . . .	18.60

This additional weight divided over each square inch of the surface of the valve makes 3.8 lbs., so that the calculation in the case of the valve resting on its seat is verified.

As for the cases of a blowing-valve, or those of the second series, the fact shows that the real pressures are less than they would be with a valve resting on its seat by 4 lbs. or 5 lbs., no other means existing of discovering that difference than by the mercurial gauge; so that if we had calculated the pressure in this case in the same way as in those of a valve resting on its seat, that is to say, by dividing the whole weight over a surface of 4.91 inches, or a valve of 2.50 inches diameter, we would have reckoned 4 lbs. too much in each case. It happens here that when the valve is considerably raised, the reduction, owing to the blowing, compensates at last for the addition required by the weight of the lever, disk, and balance-rod.

These examples prove how faulty would be any calculation of power or effect of engines, the real pressure of which had not been determined by manometrical processes; and it has been already observed, that of all the railways at present in activity, the Manchester and Liverpool Railway is the only one where a mercurial steam-gauge is to be found.

III. Firefly; valve 2.50 inches in diameter; miter 3 inches; levers 3 inches and 36 inches. This engine gave on the 2d of August, 1834:

Degrees of the balance	Corresponding pressure per square inch, by the mercurial gauge.
lbs.	lbs.
17 starting point of the valve.	
17	50
20	51

We see that, for this engine, the addition to be made to the pressure marked by the spring-balance is 8.5 lbs. per square inch for lever, disk, and balance; and that in the cases of a blowing-valve, the reduction produced by the miter may amount to 6 lbs., this miter being really considerable.

IV. Leeds; valve 3 inches; miter 3.125 inches; lever 3 inches and 36 inches; second valve screwed at too high a pressure to let any steam escape during the experiments. The engine gave, on the 28th of July, and 6th of August, 1834:

	Degrees of the balance.		Corresponding pressure per square inch, by the mercurial gauge.
	lbs.		lbs.
No. I.	28	starting point of the valve.	
	29.50	... ...	50
	29.75	... ...	51
	30	... ...	51.5
	30.50	... ...	52
	31	... ...	53
No. II.	31	starting point of the valve.	
	32	... ...	54
	33	... ...	55
	34	... ...	56
	36	... ...	57.5
No. III.	32	starting point of the valve.	
	34	... ...	60

V. Vulcan; with valves and levers exactly similar to those of the preceding engine; second valve different, but also fixed too high to give any sign during the experiments: gave on the 28th of July, 1834:

Degrees of the balance.		Corresponding pressure per square inch, by the mercurial gauge.
lbs.		lbs.
31	starting point of the valve.	
35	... ...	56.5

VI. Fury; with valves and levers exactly similar to those of the preceding engine; second valve different, but also fixed too high to give issue to the steam during the experiments: gave on the 6th of August, 24th and 25th of July, 1834:

	Degrees of the balance.		Coresponding pressure per square inch, by the mercurial gauge.
	lbs.		lbs.
No. I.	31	starting point of the valve.	
	33.50	... ...	56.50
	33.75	... ...	57.50
	34	... ...	58
	36	... ...	62.50
No. II.	32	starting point of the valve.	
	36	... ...	67

In the first series of experiments with the Leeds, the blowing of the valve was from the degree 28 to the degree 31 of the spring-balance. In the second series of the same engine it was from 31 to 36, which is considerable. In the third series it was less, say 32 to 34. It is therefore in that third series that we find the smallest reducing effect of the miter.

The experiment of the Vulcan is the common working state of the engine.

In the experiments of the Fury, there are two different effects of miter as well as in those of the Leeds.

In consequence of the weight of the levers and balance-rods of these three engines, the addition to be made to the effect of the tension of the spring is 7 lbs. per square inch; but, on the one hand, the blowing, and on the other, the circumstance of the feet of the valve not fitting the valve entirely, produce the reductions we find here. That circumstance explains the anomalies those experiments apparently present.

ARTICLE III.

OF A NEW SPRING-BALANCE AND MANOMETER.

§ 1. *Of a proposed Modification to common Valves.*

All the foregoing calculations are as many proofs of the difficulty of acquiring a knowledge of the real pressure of the steam by the inspection of the spring-balances, so as they are at present constructed, and the mistakes that must necessarily occur, whenever we have no mercurial gauge at our disposal.

These difficulties might evidently be avoided by adopting a new disposition for the valve, of which, during our stay in Liverpool in the month of July 1834, we left a drawing with one of the directors of the railway company.

The fulcrum of the lever must be placed between the valve and the spring-balance, as in fig. 17, and the balance suspended by its rod as in common weighing; besides, the long branch of the lever must equilibrate round the fulcrum C, with the short branch more the disk of the valve, which can be easily effected by augmenting a little the breadth of the shortest lever, or by putting some additional mass of metal under the valve. Lastly, the proportion between the two branches of the lever must be the same as that of the area of the valve to the unit of surface, and the seat of the valve must be fitted to it exactly.

By means of this simple disposition, it is clear that the degree inscribed on the balance will show immediately, and without any calculation, the effective pressure which takes place in the boiler. In fact, 1. The spring-balance being placed in its usual situation, in which the weight of the foot P is taken into account, no addition will be required for the weight either of the foot or the rod. 2. The two parts of the lever equilibrating with each other, there will be no addition required for the weight of the lever or the valve. Lastly, the branches of the lever, bearing to each other the proportion of the area of the valve to the unit, any number inscribed on the balance will represent an equal pressure on the unit of surface of the valve.

Thus this valve will dispense with all calculation, and will show immediately written on the balance, the real pressure per square inch. It will exactly answer the conditions required of a valve, which is intended only to limit the pressure; that is to say, that if we fix it at 50 we may be certain, without any calculation or consideration whatever, that the steam will raise it precisely at 50 lbs. pressure per square inch. This is all that is commonly required for the business of a railway, where the proprietors only wish, through prudential motives, that the engine may be regulated according to a determined pressure.

In case of theoretical experiments on certain circumstances of the motion of the engines, a deduction must still be made for the effect of the miter in the blowing; inand

these cases, recourse must still be had to the mercurial gauge: but we are also going now to propose a portable instrument, capable of being used instead of it; and which, besides, does not require the use of the above-described valve.

§ 2. *Of a new portable Manometer, calculated to replace the Mercurial Gauge.*

We have observed, that at present when we wish to know at what pressure an engine was working in a given circumstance, it is necessary, after the experiment, to bring it to the mercurial gauge, in order to know the pressure that corresponded with the different degrees of the spring-balance, observed during the work.

This second experiment, which must succeed the first, is of itself an inconvenience. Besides it is necessary, in seeking the pressures, to replace all things precisely in the state in which they were during the trial of the engine. In fact, we have seen that a valve fixed at 32 lbs. as starting-point, and blowing at 36, may represent 67 lbs. pressure, whilst that same valve having its starting-point at 31 lbs., the same degree of 36 may only correspond with 62 lbs. The second valve must also have been observed during the work, and be replaced precisely at the same point; for if it be loosened, it will give issue to a certain quantity of steam, which else would necessarily have been forced to escape through the first, and thus have augmented the pressure. Lastly, the engine-men have an interest in concealing the true pressure of the engines, for fear of their being obliged to reduce it. They calculate that it would diminish the speed of their course, and thus keep them longer on the road. In consequence, they not only loosen, secretly, the second valve, and raise from time to time the lever, in order to augment the effect of the miter with which they are very well acquainted, but they also sometimes slip a metal plate, under the pin which presses on the valve, in hopes of deceiving in regard to the real degree of the balance.

The precautions necessary to be taken in seeking the pressure, make that research more fastidious than it would seem at first sight, when one has a mercurial gauge at one's disposal. To this must be added, that the steam necessarily cools in the long passage from the engine to the instrument. It is forced to follow a metallic tube 8 or 10 feet long by half an inch in diameter, and must consequently arrive on the mercury with a less degree of pressure than in the boiler.

These difficulties proceed evidently from the impossibility of fastening the mercurial guage to the engine; for if that could be done, one might read on it the pressure immediately during the work, and no second experiment would be necessary.

We are therefore of opinion, that that instrument might be advantageously replaced by the following one:—

The engine having its two safety-valves as usual, and constructed in any way, R (fig. 19) is a cock fixed on the boiler, and susceptible, when wanted, of giving issue to the steam it contains. The orifice of the cock bears on the outside the thread of a screw, in order that the instrument may be screwed to it. The upper part of the figure represents the instrument itself. It presents a tube which is to be joined to the ajutage of the cock R. These two pieces being brought next to each other, and bearing each of them the thread of a screw on the outside, a moveable screw E, unites them firmly to each other, as long as the experiment lasts, as may be seen on the figure. Then turning the cock R, the steam will have access into the tube of the instrument.

Besides, A is a valve, the arear of which is one square inch, or any other unit of surface, according to that which one wishes to employ for measuring the pressure. This valve, while tending to rise, acts against a lever AC, the opposite end of which is kept back by the pressure of a spiral spring, forming a common spring-ballance. The two branches of this lever are equal, and their reciprocal weight, including the disk of the valve for the corresponding side, equilibrate exactly round the fulcrum C. Lastly, the point S is fastened by a screw to some part of the boiler, in order to give solidity to the whole.

The instrument being thus fastened to the engine, and the cock opened, the steam will act against the valve, and the consequence of the dispositions we have explained will be, that the inspection of the balance will immediately give the real pressure per square inch. In fact, by the position of the balance, there is no addition to be made for the weight of the rod or foot; the equilibrium of the lever renders also unnecessary any correction for its weight; and lastly, the two common valves of the engine giving issue to the surplus of steam, the valve A will never blow. The screw may thus be lowered, until the balance equilibrates exactly the pressure of the steam, by which means no effect of miter will complicate or falsify the result.

The facility with which the real pressure may be found, without being obliged to make purposely a second experiment; the accurateness of the observation, the steam not having a long passage to make before it arrives at the instrument; the advantage the instrument presents of being carried with the engine, and, when necessary, fastened to any other engine; lastly, its low price, whereas the mercurial steam-guage is very expensive: all those reasons combine to pursuade us that this thermometer may be of some use. With it, all the difficulties we met with in our experiments would immediately have disappeared. It may, besides, also serve to determine the pressure, as well in locomotive engines, as in other high or low-pressure steam-engines.

The accurateness of the instrument may easily be vrified once for all; 1, by measuring the valve when separated from the engine; 2, by examining whether the lever equilibrates of itself on the fulcrum; 3, by taking the balance off and suspending known weights to it, to see whether they coincide with the divisions.

§ 3. *Comparative Table of the different Modes of expressing the Pressure of Steam.*

To complete what has been said in this article, and to facilitate to the reader the converting of the different measures of pressure, which we shall be obliged to make use of in the course of this work, we subjoin here a table of the different modes of expressing the pressure of steam. We have calculated it by half atmosphers, but the intermediate degrees may be easily filled up.

COMPARATIVE TABLE OF THE DIFFERENT MODES OF EXPRESSING THE PRESSURE OF THE STEAM.

Total Pressure of the Steam.				Surplus of that force over the atmospheric pressure, or effective pressure.			
In atmospheres.	In inches of mercury.	In lbs. per square inch.	In lbs. per square foot.	In atmospheres.	In inches of mercury.	In lbs. per square inch.	In lbs. per square foot.
1	30	14.7	2,117	...	...	...	...
1.5	45	22	3,175	0.5	15	7.3	1,058
2	60	29.4	4,234	1	30	14.7	2,117
2.5	75	36.7	5,292	1.5	45	22	3,175
3	90	44.1	6,350	2	60	29.4	4,234
3.5	105	51.4	7,409	2.5	75	36.7	5,292
4	120	58.8	8,467	3	90	44.1	6,350
4.5	135	66.1	9,526	3.5	105	51.4	7,409
5	150	73.5	10,584	4	120	58.8	8,467
5.5	165	80.8	11,642	4.5	135	66.1	9,526
6	180	88.2	12,701	5	150	73.5	10,584

CHAPTER III.

OF THE RESISTANCE OF CARRIAGES MOVED ON RAILWAYS.

§ 1. *Necessity of making further researches on that subject.*

From the description we have given of the engine, we see that the steam, by acting on the pistons, communicates to the wheels a rotary motion, which must necessarily make the engine advance, provided the train that follows, does not oppose a greater resistance than the force of which the engine disposes.

The first point therefore which must be considered concerning the motion of locomotive engines is the resistance opposed by the trains they draw.

Those trains consist of a more or less considerable number of carriages called wagons, upon which the goods are loaded. Their resistance to the motion depends not only on their weight, but also on the state of the railway, and the more or less perfect construction of the carriages. The purpose of the establishment of a railway being to produce a perfectly hard and smooth road,

on which the carriages may roll with ease, if the railway is not kept in good order, or if it does not answer the intentions for which it was established, it is clear that the rasistance the train will oppose along those rails will be so much the greater. The same will also take place if the carriages, being ill-constructed or badly repaired, have a considerable friction.

From this observation, we see that the power required to draw a given weight, a ton for instance, cannot be the same upon all railways, nor with all sorts of carriages. On perfectly smooth rails, and with a well-greased and well-constructed wagon, the draft of a ton may require only a power of 8 lbs. We mean to say that a weight of 8 lbs. suspended at the end of a rope passing over a pulley, will, in that case, be sufficient to make a loaded carriage, weighing a ton, move forward. On another railway, on the contrary, and with carriages of another construction, the same load of a ton may require a power of 10 lbs., and perhaps more.

The old wagons, on which some experiments had been made, required a power of 10 lbs. to 12 lbs. for each ton weight of the load. Since that time, the carriages had been brought to greater perfection, and had never been submitted to any experiment made on a large scale, and in the usual working state. At the time of the introduction of the new wagons at Liverpool, one trial had been made with a single wagon, and just at the moment it was coming out of the hands of the maker. But as that wagon had been carefully oiled on purpose for the experiment, and as it had not yet encountered any shock by which the axles might have been bent, the wheels warped, or the hind wheels prevented from following exactly in the track of the fore ones; and as, moreover, the rails had been nicely swept, the result of such an experiment could scarcely be considered as a common practical result; and, in fact, the friction of the trains continued to be calculated on the Liverpool Railway at the rate of 10 lbs. per ton. These uncertain data could not be admitted in a new work on the subject.

It became, therefore necessary for us to find another base for the calculations that were to be made on modern wagons. However, the occasion which gave rise to the experiments we are going to relate, occurred in the work of the locomotive engines. They pointed out themselves, in a way, the errors committed in the appreciation of the resistances they overcame. This point is worthy of notice, as it proves at the same time both the perfection of the engines, and the correctness of the calculations, to which it is possible to submit them. It inspires consequently more confidence in the other results which were obtained in the same way, and it is for that reason we mention it. Having made, during our stay at Liverpool, in 1834, a great number of experiments on the power of locomotive engines, we found than one of those experiments, made with the Atlas, and which we shall have occasion to relate hereafter, appeared to exceed the limits of the power of that engine. The Atlas had, on July 23, on an inclined plane at $\frac{1}{1300}$, drawn 40 wagons, weighing 190 tons, and the diameter of its cylinder was only 12 inches. According to the ideas admitted on the railway, on the resistance of the trains, this fact could only be explained, by supposing either that the proportions of the engine were not exactly what they were thought to be, or that the railway had a different inclination from what was computed, or the train a different weight from that inscribed on the weighing books. Other experiments, however, made by us with other engines, in other circumstances, and in other points of the railway, having given similar results, we were already convinced that the friction of the wagons could not exceed 8 lbs. per ton, and that the mistake lay there, unless we preferred supposing that mistakes had been made in the dimensions of all the engines, and in the levelling of all the parts of the road.

It became, therefore, necessary to ascertain the fact in a direct manner, by establishing a series of experiments for that purpose; but it was particularly satisfactory to have been led to the knowledge of the truth by the calculation, as the experiment became thus the verification of it.

§ 2. *Of the Friction determined by the Dynamometer.*

The most natural means of determining the friction or resistance of the wagons, seemed to be the dynamometer, which gives directly the force of traction required to execute the motion; but as the act of drawing, either by men or any other living moter, takes place by starts, the dynamometer oscillates between very distant limits, and can give no certain result. It appeared, however, to us, that if the draft were effected by an engine, the effort of which is always equal, and the motion regulated by the mass of the train itself the oscillation of the dynamometer would not be so great, particularly if the instrument were to be fastened to one of the last carriages, on which the pulsations of the engine have naturally much less effect.

Therefore, at the moment the Leeds engine was setting off with a train of 12 wagons, after the whole mass had been put in motion, and while the motion continued with an uniform velocity of three or four miles an hour, the chain of the three last carriages was unhooked, and replaced by a circular spring-balance, which had been prepared for the purpose. The rod of the balance was fixed to the frame of the ninth wagon, and the three following, which were the last of the train, were fastened to the spring. The experiment took place between the milestones one and a half and two of the Liverpool Railway, on a space of ground which is a dead level.

We expected to see the index of the balance remain nearly steady; but we were disappointed. Its average position was near the point marking 100 lbs, ; but it underwent very great variations, that is to say, from 50 lbs. at least, to 170 lbs. at most; and even two or three times, at certain extraordinary starts of the engine, the needle ran to the end of the balance, marking 220 lbs. As, however, this case happened only accidentally, it could not be considered as an effect of the regular draft: and, indeed, after the shock which had caused this extraordinary excursion, the needle immediately returned to its usual point of 100 lbs., and began again its oscillation between 50 lbs. and 170 lbs. After having, to no purpose, waited to see whether the motion would become more regular, we concluded that the experiment was not suspectible of a greater degree of precision.

The variations of the needle between 50 lbs. and 170 lbs., gives an average of 110 lbs.

The three wagons weighed together 14.27 tons. So the experiment gave $\frac{110}{14.27}$ or 7.70 lbs. resistance per ton.

It is important to remark, for what will be said hereafter, that this experiment was free from the direct resistance of the air; for these three waggons, being the last of the train, underwent from the air only a very inconsiderable lateral resistance, particularly as the speed was only three or four miles an hour. All the direct resistance of the atmosphere took place on the first carriage of the train, with which our experiment had nothing to do.

This approximation, as it was, might be be useful, but it was thought necessary to obtain more positive results.

In consequence a convenient place having been chosen on the Liverpool Railway, at the foot of Sutton inclined plane, and at a distance of 11½ miles from Liverpool, the level was taken in the most accurate manner, to a tenth of an inch, and the experiments commenced on the following principle:—

§ 3. *Of the Friction determined by the Angle of Friction.*

Let us suppose a heavy body left to itself on an inclined plane AB (fig. 23,) and sliding without friction to the foot of the plane; let us suppose at that point another plane, being the continuation of the first, and on which the same body continues its motion.

The body will descend along the plane, by virtue of its gravity; but that force will act only partially: it will be decomposed into two others, one perpendicular to the plane, which will be destroyed by the resistance of that plane, and the other in the sense of the plane, which will have its full effect, and will be the accelerating force of the motion. If therefore g express the intensity of gravity, and θ' the angle of the plane, with a vertical line, the accelerating force of the motion will be

$$\varphi = g \cos \theta' ;$$

but the general expression of any accelerating force is $\varphi = \frac{\dot{v}}{\dot{t}}$, v being the velocity and t the time; consequently

$$g \cos \theta' = \frac{\dot{v}}{\dot{t}} .$$

Besides, when we consider only an infinitely small interval of time, any motion may be regarded as uniform, which, by ex-

pressing by x the space passed over, gives

$$v = \frac{\dot{x}}{t},$$

or

$$t = \frac{\dot{x}}{v}.$$

Thus the equation above becomes

$$vv = g \cos \theta' x.$$

Making the integral, and observing that the velocity is zero at the starting point, or that $x = o$ gives $v = o$, we have

$$\frac{v^2}{2} = g \cos \theta' x.$$

This equation gives the velocity of the moving body in any point whatever of the first plane.

Consequently, if we express by x' the distance of the point B, from the starting point, measured along the plane, the velocity of the falling body, when arrived at that point, is

$$V^2 = 2g \cos \theta' x'.$$

This is the velocity the body has acquired, at the moment it is going to pass from the first to the second plane. This velocity being applied to it in the direction of the first plane, would produce, in the direction of the second, only a certain velocity, resulting from the relative inclination of the two planes, if the passage from the one to the other took place abruptly. But if the passage is effected by a continued curve, we know that there will be no loss of velocity, and the body will begin its motion on the second plane with the same velocity it had in leaving the first. This will, therefore, be its velocity in beginning its descent on the second plane.

The body will, besides, continue to be impelled by gravity. θ'' being the angle of inclination of the second plane with a vertical line, the gravity will produce an accelerating force

$$\varphi = g \cos \theta'';$$

and by a calculation similar to the former, we will also have on that plane,

$$v^2 = 2g \cos \theta'' x + C.$$

In this equation, C is determined by the condition that $x = o$ must give for v the incipient velocity of the second motion; and as we have seen that this incipient velocity is

$$V^2 = 2g \cos \theta' x',$$

it follows that

$$C = 2g \cos \theta' x'.$$

Substituting that value of C, the velocity in any given point of the second plane is expressed by

$$v^2 = 2g \cos \theta'' x + 2g \cos \theta' x'.$$

Further z' and z'' being the vertical heights gone through on each plane by the moving body, we have

$$x' \cos \theta' = z', \text{ and } x \cos \theta'' = z''.$$

Consequently the equation may be written in the following form:

$$v^2 = 2g\,(z' + z'');$$

or

$$v^2 = 2gz,$$

by letting z express the vertical height of the point where the moving body is below the starting point.

This is therefore the equation of the motion, in the case of a body moving without any friction or resistance whatever. In that equation we see that we can only have $v = o$, when $z = o$; that is to say, that the body once put in motion, will not stop until it has re-ascended the second plane to the height of its starting point, that second plane being then supposed to be inclined in an opposite sense to the first.

But if the body moves with the friction, experience having proved that friction does not increase with the velocity, it will act as an uniformly retarding force, contrary to the gravity along the plane. By the introduction of that new force, the accelerating forces of the motion on each of the planes will no longer be

$$g \cos \theta', \text{ and } g \cos \theta'';$$

but

$$g \cos \theta' - f, \text{ and } g \cos \theta'' - f,$$

f being the expression of the retarding force owing to the friction.

In that case the velocity in any given point m of the second plane, the distance of which to the point B is expressed by x, will consequently be

$$v^2 = 2\,(g \cos \theta'' - f)\,x + 2\,(g \cos \theta' - f)\,x'.$$

Effecting the indicated operations, and substituting z'' for $x \cos \theta''$, z' for $x' \cos \theta'$ and z for $z' + z''$, we have

$$v^2 = 2\,[gz - f(x' + x)];$$

which equation gives the velocity in any point of the motion of the planes, taking the friction in consideration. In that case we see by the equation that we cannot have $v = o$, unless $z = o$, $x' = o$, $x = o$, that is to say at the beginning at the motion; or unless we have the equation

$$gz - f\,(x' + x) = o.$$

If, therefore, a body once put in motion stops at any point, m for example, that point must fulfil the above condition, or we must have

$$gz = f\,(x' - x).$$

If we multiply the two members of that equation by M, mass of the moving body, we shall have

$$gMz = fM\,(x + x').$$

The quantity g being the action of the gravity on one of the elements of the body, gM is its action on the whole of that body, or its weight which we shall express by P. Also f is the retarding action of the friction, as relates to a single element of the moving body. But the friction being proportional to the weight, fM is the friction when we consider the whole mass of the body. Expressing, then, that friction by F, and making those two substitutions, the equation may be written in the following form:

$$Pz = F\,(x + x').$$

Let us suppose, then, that, having left in the beginning the moving body free on the inclined planes, it has descended to the point m, for instance, and has not gone farther; that point must necessarily fulfil the above condition, else the moving body would not have stopped there. If, therefore we measure on the spot the quantities z, x and x', and know the weight P, the equation will contain no other unknown quantity but F; so that equation will give us its value, viz.

$$F = P \frac{z}{x + x'}.$$

Consequently, when a body of a given weight P, placed in the above stated circumsances, stops in descending at a certain point m, *the value of the friction that stopped it, will be found by dividing the total height from which the body descended by the total distance which it travelled over.*

This determination once made, it is clear that if we were to construct an inclined plane, the height of which were z, and the length $x + x'$, and if we were to place the body on it, it would remain in equilibrium. In fact, the gravity that tends to impel the body onwards would be exactly equal to the friction that retains it.

The ratio $\frac{z}{x \times x'}$ gives us, consequently, what is called the angle of friction; and it is for that reason that we have also called by that name the principle we have explained, and which we shall make use of in the following experiments.

§ 4. *Experiments on the Friction of Wagons.*

A series of experiments was accordingly undertaken on that principle, upon one of the inclined planes of the Liverpool and Manchester Railway.

From a point taken on Sutton inclined plane, at 50 chains from the foot of that plane, 34 distances of 10 chains or 330 feet each were measured. At each of these points a numbered pole was fixed in the ground, and the level exactly taken. The following table shows the result of the levelling operation expressed in feet and decimals of feet.

Number of the posts.	Distance from the first post in feet.	Vertical decent below the first post in feet, and decimals of feet.	
0	0	0	Starting point.
1	330	3.47	
2	660	7.07	
3	990	10.62	
4	1,320	14.36	
5	1,650	18.17	
6	1,980	21.77	
7	2,310	25.53	
8	2,640	28.98	
9	2,970	32.07	
10	3,300	34.61	Foot of the inclined plane, or rather middle point of the continued curve.
11	3,630	35.06	
12	3,960	35.19	
13	4,290	35.23	
14	4,620	35 37	

Number of the posts.	Distance from the first post in feet.	Vertical descent below the first post in feet, and decimals of feet.
15	4,950	35.71
16	5,280	36.17
17	5,610	36.44
18	5,940	36.66
19	6,270	36.80
20	6,600	36.92
21	6,930	37.06
22	7,260	37.14
23	7,590	37.22
24	7,920	37.37
25	8,250	37.34
26	8,580	37.63
27	8,910	37.92
28	92,40	38.14
29	9,570	38.35
30	9,900	38.54
31	10,230	38.67
33	10,560	38.77
33	10,890	38.92
34	11,220	39.08

On the ground where the experiments took place, a little beyond the foot of the inclined plane, the wagons had to cross three junction roads, each of them necessitating the passing over three switches, as may be seen in fig. 24. This made in all nine switches, either on one side of the rails or the other. On passing each of these obstacles, the wagon received a jolt from the unevenness of the road, and their velocity was checked. The ground was consequently unfavourable for experiments, and made the friction appear rather more considerable than it really was.

The wagons used for the experiments are of the following construction. They consist of a simple platform, supported on four springs. Their wheels are three feet in diameter, and fastened to the axletree which turns with them. The body of the carriage rests upon the axletrees, but outside the wheels; that is to say, that the axles are prolonged through the nave, in order to support the carriage. At the bearing they are turned down to $1\frac{7}{8}$ inches in diameter. The chair is made of brass at the bearing-point. In its upper part it contains grease, continually feeding upon the axle through a hole in the chair, and the waste of which is prevented by a cover on the underside of the chair. The grease-box, which is filled every morning, is sufficient for the whole day. In the experiments, no alteration whatever was made to the usual disposition; every thing was left as it is in the daily work, as well in regard to the wagons as to the rails. Among the wagons there are some, the extremity of the axle of which, instead of being from one end to the other of an uniform diameter of $1\frac{7}{8}$ inches, is thickened near the frame of the carriage by three eighths of an inch, and is on the contrary diminished as much at the other end. Consequently, that part of the axle is composed of three cylindrical parts equal in length, and the diameters of which are, $2\frac{1}{8}$, $1\frac{7}{8}$, and $1\frac{5}{8}$ inches.

This disposition is adopted, in order to leave the mean diameter as it was at first, but to give, however, a greater strength to the point which appears to suffer the most. There are, nevertheless, but few axletrees constructed on that principle, they having been only meant as a trial, the advantage of which has not yet been confirmed by experience.

I. On July 29, 1834, five wagons taken at random, and loaded with bricks, were brought to the spot fixed for the experiments by the SUN engine. The train was followed ed by a sixth empty wagon. The weight of five wagons together, accurately taken with their load, amounted to 30.65t., and including the weight of ten persons, not weighed with them, to 31.31t., or to 6.26t. per carriage.

The middle of the train having been carefully placed facing the starting point on the plane, and the engine being taken away, the brakes were taken off all at once, at a given signal, and the five wagons were left to their gravity on the plane. They continued their motion till 33 ft., beyond post No. 30, having thus run a total distance of 9933 feet, with a difference of level, between the points of departure and arrival, of 38.55 feet.

By recurring to the principle laid down above, we had, in this experiment, $x+x=9933$ feet, $x=38.55$ feet and the friction was the $\frac{38.55}{99.33}$ or $\frac{1}{258}$ of the weight. Consequently, the friction of a ton was $\frac{1t.}{258}=\frac{2240 \text{ lbs.}}{258}=8.69$ lbs. This friction, however, included the resistance of the air, and was augmented by the above-mentioned circumstance, of the passage of nine switches at the foot of the plane.

II. After this first experiment, 300 bricks were taken out of each of the wagons. The weight of 100 of those bricks having been carefully taken, and found to be 855 lbs.; this was, consequently, an alleviation of 2,565 lbs. or 1.145t. for each carriage. The weight of the five loaded wagons, including the same 10 persons, amounted thus to 25.58t. or 5.12t. for the average weight of each of them.

In this state the wagons were brought back to the same starting point as at first, and left again to their gravity on the plane. They continued their motion until 84 feet beyond the post No. 28, having gone through a total distance of 9324 ft. on a difference of level of 38.19ft. In this second experiment the friction was $\frac{1}{244}$ of the weight, or 9.17 lbs. per ton: so the resistance per ton was less in the first case than in the second.

The wagons were then, for the third time brought back to the starting point, and each of them was successively and separately left to itself on the plane, as also the empty wagon, when they gave the following results:—

	Number of the wagon.	Weight loaded.	Distance gone through.	Difference of level.	Friction.	Friction per ton.
		tons.	feet.	feet.		lbs.
I.	No. 294	4.65	7,326	37.16	$\frac{1}{197}$	11.36
II.	100	5.15	6,663	36.95	$\frac{1}{180}$	12.42
III.	196	5.20	7,455	37.19	$\frac{1}{200}$	11.17
IV.	111	5.00	stopped by mistake		"	"
V.	150	4.85	stopped by mistake		"	"
VI.	empty wagon, 202	1.85	6,204	36.78	$\frac{1}{169}$	13.28

The wagon, No. 100, at the moment it arrived, had one of its axle-boxes very hot, which explains why it did not continue its motion as far as the others, though equally loaded. The empty wagon was very low, being formed only of a platform surrounded by an open railing.

According to these experiments, each of the loaded wagons, taken separately, had an average friction of 11.3 lbs. per ton; and those same five wagons, united together in a train, had only a friction of 9.17 lbs. per ton. The difference in favor of a greater number of carriages was evidently owing to the resistence of the air, the effect of which only takes place on the first carriage. If the train is composed of only one wagon, that one must bear alone the whole resistance; but if it is composed of several, the resistance of the air remaining the same, is divided between all the wagons, and becomes consequently less peecestible on each of them. The same effect may be observed in the first experiment compared with the second. The number of carriages was the same in both, but the first train being more heavy, the resistance of air was distributed between a greater aumber of tons.

It appeared therefore necessary, in order complete our investigation, to make other experiments, with trains of different weights and in different circumstances. In the following experiments the wagons were no longer loaded with bricks, but with goods of different sorts, such as were furnished by the trade in the common business of the railway.

VII. The following day, July 30, a train of 19 loaded wagons was brought to the same place by the MARS engine. The 19 wagons weighed together exactly 92 tons, giving 4.84 tons for the average weight of each of them. The train was again stopped on the plane, so as to make the middle or centre of gravity of the mass exactly facing the post No. 0; and the whole was left to its gravity as in the foregoing experiment. The mass being put in motion, stopped at 168 ft. beyond the post No. 32. So the space gone through was 10,728 ft., and the difference in level between the starting and stopping points was 38.85 ft., which made the friction equal to $\frac{1}{276}$ of the weight, or 8.11 lbs. per ton.

VIII. The same day the same experiment was made with the tender of the JUPITER engine, which stopped at 27 feet beyond the post No. 18, and its friction was, consequently, including the resistance of the air, $\frac{1}{263}$, or 13.76 lbs. per ton. This tender is nothing but a wagon of a particular form, giving, comparatively, a considerable hold to the air, particularly when it is not much loaded. The tender of the JUPITER was then nearly empty, having only sufficient provisions to bring back to Liverpool the persons that were present at the experiment.

This as well as the preceding day's experiments were made jointly with Mr. H. Earle, one of the directors of the railway; Mr. J. Locke, engineer of the Grand Junction Railway; Mr. King, of the Liverpool Gas-works, and other persons more or less directly connected with the administration of the Company.

IX. On the 31st of July the tender of the ATLAS engine, then weighing $5\frac{1}{2}$ t., was left to itself from a point situated at 84 ft. below the post No. 1. It stopped at 90 ft. beyond the post No. 23, having run over a space of 7,266 ft. by 32.88 ft. descent, which gives for the friction $\frac{1}{221}$, or 10.13 lbs. per ton.

X. The same day the train led by the same ATLAS engine, composed of 14 wagons, weighing together 61.35 t., was left to its gravity on the plane from a point situated at 24 ft. above the post No. 1. Not having at our disposal a sufficient number of men, the train could not be stopped before. It ran to 15 ft. before the post No. 5; that is to say, over a space of 9579 ft., in a descent of 35.32 feet, which gives for the friction $\frac{1}{271}$, 8.26 lbs. per ton.

XI. On the 1st of August a train of 10 wagons was brought to the place of the experiments by the VESTA engine. The 10 wagons weighed together 43.72 t. The tender of the engine, weighing 5 tons, was left attached to them, making thus together 48.72 t. for 11 carriages, or 4.43 t. per carriage. The whole was left to its gravity on the plane, and ran till 108 ft. beyond the post No. 30, being a space of 10,008 ft. on a slope of 38.58 ft. which gives for the friction $\frac{1}{259}$, or 8.64 lbs. per ton.

XII. The same day 24 wagons were brought to the same place by the ATLAS engine, these 24 wagons weighing together 104.50 t., and making with the tender of the engine, which weighed 5.50 t., 110 t. for 25 carriages, or 4.40 t. per carriage. They were left to their gravity on the plane, and did not stop until they reached 108 feet beyond the post No. 32. They ran, consequently, over a space of 10,668 ft., with a descent of 38.82 ft., which puts the friction at $\frac{1}{273}$, or 8.15 lbs. per ton.

Lastly, complete trains, that is to say, the engine, tender, and wagons together, were brought to the trial of gravity on the plane, and gave the following results :—

XIII. On the 2nd of August the FURY engine, followed by its tender and by 17 wagons, weighing as follows: wagons 81.26 t., engine 8.20 t., tender 5.5 t., together 94.96 t., was left to its gravity on the plane. The engine and its tender being, on account of their weight, reckoned for three wagons in the position of the centre of gravity of the mass, the whole was considered as equal to 20 wagons. The train was consequently stopped so as to place facing the starting-post, the interval between the seventh and eighth wagon. The mass, being put in motion, stopped at 42 ft. beyond the post No. 34. It had run over 11,262 feet, with a descent of 39.10 ft.; which put the friction at $\frac{1}{288}$ of the weight, or 7.78 lbs. per ton, including the engine, tender, and wagons.

The whole weight of the train, engine included, was 94.16 t. The resistance of the whole, taken at the rate of 7.78 t. as it had been found, was then 733 lbs. But the engine, submitted alone and a moment before to the experiment, had been found to have 113 lbs. friction, as we shall see below. Of these 733 lbs. there were, consequently, only 620 applicable to the wagons and tender. Their aggregate weight was 85.96 t.; consequently, the resistance belonging to them was 7.21 lbs. per ton.

XIV. On the 2nd of August the VULCAN engine, weighing 8.54 t., followed by a train of twenty wagons, weighing 96.30 t., and by a tender weighing 5.5 t., forming together a mass of 110.14 t., was brought to the place of the experiments. Not having been able to stop the train in time, it could only depart from a point situated at 18 ft. below the common starting-post, the engine and its tender being reckoned together for three wagons, in fixing the situation of the centre of gravity. The mass stopped at 39 ft. beyond the post No: 33. The distance ran over in 12′ 10″ was 10,911 ft., on a descent of 38.75 ft. The friction calculated over the whole was consequently $\frac{1}{282}$ of the weight, or 7.96 lbs. per ton.

The total resistance for the 108.50 t. weight of the whole train, engine included, was 863 lbs.; if from that we deduct 127 lbs. for the resistance of the engine itself, according to an experiment made immediately afterwards, and of which we shall speak below, here remains for the 100.16 t. of the train and tender 736 lbs., which make 7.35 lbs. per ton.

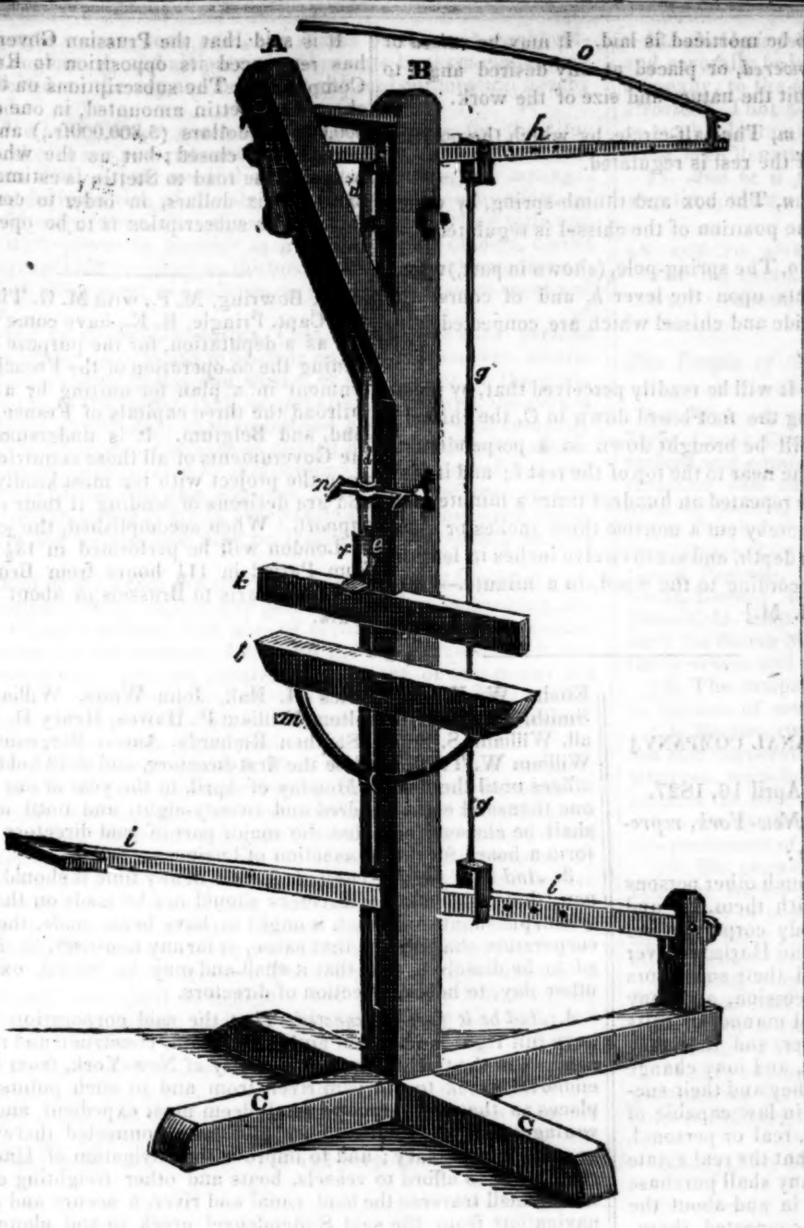
XV. To conclude, on August 15, the LEEDS engine, weighing 7.07 t., followed by its tender and a train of seven wagons, the aggregate weight of which, besides the engine, was 33.52 t., was also submitted to the same experiment. Starting exactly from the post No. 0, it ran till 255 ft. beyond the post No. 24. Distance 8,175 feet; descent 37.35 ft.; friction of the whole $\frac{1}{219}$, or 10.23 lbs. per ton.

The whole train weighing 40.59 t., had therefore a total resistance of 415 lbs.; and as the engine submitted alone to the experiment had been found to have 112 lbs. friction, on those 415 lbs. there were only 303 lbs. applicable to the wagons and tender, and consequently the resistance belonging to the train was $\frac{1}{248}$, or 9.04 lbs. per ton.

(To be Continued.)

MORTICING MACHINE.—The following cut represents a Morticing Machine, exhibited at the Fair of the AMERICAN INSTITUTE, in October last, by Mr. George Page, of Keene, New-Hampshire, to which was awarded a *silver medal*. This simple and unpretending machine was viewed, and its operations witnessed, by a large number of practical mechanics, who were highly gratified by the rapidity and precision of its movements, and the wonderful accuracy of its work. Any person could, at once, perceive that, with ordinary care, and a few hours' experience, any man can perform as much labor in *one day*, with this machine, as in a *whole week* in the ordinary mode. Such, indeed, is the simplicity of its operation, and economy of its use, that over three hundred machines have been sold since the Fair in October last; and it is probably not too much to say, that the owners of them have, on an *average*, saved *twice the cost of them*, in addition to the great advantage and convenience in forwarding work during the present scarcity and high prices of labor. A small proportion, however, of those mechanics who have morticing to do, have yet obtained them. A small number only of those journeymen who "work by the piece," have yet consulted their own interest by adopting them. A few, however, who view things properly, have got them, and are, consequently, enabled to do much more work, and, of course, to earn more money, than was possible before. If a man, who worked on bedsteads, for instance, which have much morticing, could formerly earn $15 a week, he can now do the same morticing in one-sixth or one-eighth of the time, and, of course, do more work, and certainly do it better. Indeed, any man who has much morticing to do, will save the cost of a machine in a month, and even less.

This machine may also be used, with a little alteration, for morticing *hubs*, for car-



riages, waggons, &c.; and an experienced hand can prepare and mortice a sett of common-sized carriage hubs in *¾ths of an hour*, with ease, and do them far more *accurately* than in the ordinary way.

The HUB MACHINE can be attached to the morticing machine, and the whole will not occupy, when in use, a space of over four feet by six in the shop, for the workman and his materials.

We are *un*-authorised, yet take the liberty of referring to the following gentlemen, who have machines in use, and who will probably give an opinion in relation to them:—

Talbot & Perry,	Prince st.,	used for mahogany doors
James De Witt,	James st., do	do
Charles Baker,	Grand st., do	do
Mr. Lasher, 16	Downing st., do	do
J. Green,	Orange st., do	do chairs
James Berry,	Le Roy st., do	do
Hadden & Gedney,	Prince st., do	carpenters' work.
George Smith,	Prince st., do	do
George Webb,	Greene st., do	do
J. L. Black,	Amos st., do	do
Andrew Woodruff, Jefferson, corner of Henry st.		
Clarkson Day, 488 Broome st.		

An hundred others who have used them might also be named if it were necessary, but it is not, as all the descriptions and opinions in the world will not be as satisfactory to many as one half hour's observation of its operation; we therefore refer those who may desire to examine it, to the office of the manufacturer, No. 136 Nassau, corner Beekman street, or to the shops of the gentlemen whose names are given above for further evidence, if they desire it.

DESCRIPTION.

C, C, B, A, the *frame*, consisting of two cross pieces or sills, with an upright post from their centre, and a piece projecting upward in front, at an angle.

d, d, The slide, with a socket in the lower end, into which the chissel is inserted. This slide is of iron, connected with the lever *h*, and sustained in its place by two boxes, passing through the upright, which are regulated by thumb-screws on the side of the post.

e, The CHISSEL, a small but very important part of the machine. It is made of cast steel, about six inches in length, and from *one-eighth* to an inch in diameter.—The cut is perpendicular on *one* side, and beveling on the other, with *side cutters*, projecting backward about one-fourth of an inch, which serve not only to make the sides of the mortice as smooth as the ends, but also to clear the chips, as the chissel is withdrawn from the mortice.

This chissel is either *single*, or *double*, cutting one or two mortices of equal width and depth at the same time. It has also a tool for making *dowells*, and another for cutting holes in Venitian blinds, for the cord to pass through. The two latter are of much use, especially that for making dowells, or pins, of any size, from one-fourth to an inch in diameter, and 4 to 6 or 9 inches in length; and the other performs, at one pressure of the foot, an operation which in any other way requires five times the labor.

f, The stop, which is made fast to the upright by a bolt and thumb-screw, to prevent the timber from rising when the chissel is drawn up by the spring.

g, g, The connecting rod between the lever *h* and the treadle. This rod is movable to accommodate the depth of the mortice.

h, The *lever*, passing through the upright post and front brace, to which it is connected, in front, by two straps of iron. The lever, is about three feet in length, and at its extreme end connected with a spring-poll to raise the chisel from the mortice.

i, i, The treadle, or foot-board, by which the machine is put in motion. This foot-board is also, like the lever, about three feet in length; passing through a long mortice in the lower part of the upright post, and made fast *at the back end*, to a short upright standard, rising about 14 inches from one of the cross sills. It is then connected by an iron rod in the rear of the upright post, with the lever at the top, which rests upon the slide *d, d*, into which the chissel is inserted. The lever *h* acts upon a pivot in *front*, resting, at about nine inches from the pivot, upon the top of the slide *d, d*, which is moveable—and is connected by a rod with the treadle *i, i*, which acts upon a pivot at its extreme *back* end. By placing one foot upon the foot board, and pressing it down, the back end of the lever *h* also descends, and causes the chissel to perform its office upon the timber, which is laid upon the rest *l*. It will be readily perceived that a powerful leverage is obtained by this arrangement, and that a rapid motion is easily produced with the foot, by which the chissel is driven into the timber, and drawn out again by the aid of the spring pole.

The timber to be mortice is held in its place on the rest *l*, until it receives a thrust from the chissel, when it is moved forward one eighth of an inch, by hand, or otherwise, as the chissel rises, and falls again by

the aid of the foot. When the mortice is headed down at one end, to its proper depth, the chissel is turned the half of a revolution, by the aid of a spring and movable box *n*, and again confined, by a spring, in a proper position, and the timber is caused to retrace its course, and the mortice is completed to a uniform depth, and headed down at the other end; and, on turning it over, the chips will either drop out, or may be easily picked out, as the chissel is so constructed, with side cutters, as to cut at *both sides*, as well as at the end; and therefore the mortice is not only perfectly true, or uniform in its sides, but also smooth, or free from splinters, arising from cross grain, as is frequently the case in the ordinary mode of morticing.

k, A back board or fence, which serves to keep the timber parallel.

l, The *rest* or *bench*, on which the timber to be morticed is laid. It may be *raised* or *lowered*, or placed at any desired angle to suit the nature and size of the work.

m, The half-circle, by which the position of the rest is regulated.

n, The box and thumb-spring, by which the position of the chissel is regulated.

o, The spring-pole, (shown in part,) which acts upon the lever *h*, and of course the slide and chissel which are connected with it.

It will be readily perceived that, by pressing the foot-board down to C, the chissel *e* will be brought down in a perpendicular line near to the top of the rest *l*; and it may be repeated an hundred times a minute, and thereby cut a mortice three inches or more in depth, and six to twelve inches in length, according to the wood, in a minute.—[Ed. M. M.]

It is said that the Prussian Government has renounced its opposition to Railroad Companies. The subscriptions on the Exchange at Stettin amounted, in one day, to 800,000 rix dollars (3,300,000fr.,) and was immediately closed; but as the whole expense of the road to Stettin is estimated at 2,000,000 rix dollars, in order to complete this sum, a subscription is to be opened at Berlin.

Dr. Bowring, M. P., with M. G. Thomas, and Capt. Pringle, R. E., have come to Paris, as a deputation, for the purpose of obtaining the co-operation of the French Government in a plan for uniting by a grand railroad the three capitals of France, England, and Belgium. It is understood that the Governments of all these countries look upon the project with the most kindly eyes, and are desirous of lending it their cordial support. When accomplished, the journey to London will be performed in 13½ hours from Paris; in 11¼ hours from Brussels; and from Paris to Brussels in about seven hours.

AN ACT

TO INCORPORATE THE HARLÆM RIVER CANAL COMPANY.

Passed April 16, 1827.

Be it enacted by the People of the State of New-York, represented in Senate and Assembly:

1. That Peter Embury, Richard Riker, and such other persons as now are, or hereafter may be associated with them, be, and they hereby are constituted and created a body corporate and politic, in fact and in name, by the name of "the Harlæm River Canal Company," and by that name, they and their successors and assigns shall and may have continual succession, and may sue and be sued, defend and be defended, in all manner of suits and actions, in all courts and places whatsoever, and that they and their successors may have a common seal, and may change and alter the same at pleasure; and also, that they and their successors, by the same name and style, shall be in law capable of purchasing, holding and conveying any estate, real or personal, for the use of the said corporation: *Provided*, That the real estate so to be holden, shall be such as the said company shall purchase and obtain by voluntary transfer, to be used in and about the construction of the said canal, and the works connected therewith.

2. *And be it further enacted*, That the stock, property and affairs of the said corporation shall be managed by thirteen directors, to be elected from the stockholders, (one of whom to be president) who shall hold their offices for one year, and until others shall be elected in their stead; and that the directors of the said company, after the term of the first board thereof shall have expired, shall be elected on the fourth Monday of April in each and every year, at such time of the day, and at such place, as the directors for the time being may appoint; and public notice shall be given by the said directors, not less than fourteen days previous to the time of holding the said election, in at least two of the public newspapers printed in the city of New-York; and the said election shall be held under the inspection of three stockholders, not being directors, to be appointed by the board of directors; and such election shall be by ballot, and by a plurality of votes of the stockholders present, or their proxies, allowing one vote for every share of stock; and if it shall happen at any election that two or more persons have an equal number of votes, so that no choice shall have been made as to such person or persons, then the said stockholders, herein before authorised to vote at such election, shall proceed by ballot a second time, and by a plurality of votes determine which of the said persons so having an equal number of votes, shall be the director or directors, so as to complete the whole number of twelve; and the said directors, as soon as may be after the election, shall proceed to elect by ballot one of their number, to be their President; and if any vacancy shall be occasioned in the board, by resignation, death, or otherwise, the same shall be filled for the remainder of the year in which it may happen, by such person or persons as the remainder of the directors for the time being, or the major part of them, shall appoint; that Richard Riker, Benjamin Bailey, Elisha W. King, Charles H. Hall, John Watts, William R. Smith, Alexander Hamilton, William P. Hawes, Henry D. Sewall, William S. Smith, Stephen Richards, Aaron Sergeant, and William W. Todd, shall be the first directors, and shall hold their offices until the fourth Monday of April, in the year of our Lord one thousand eight hundred and twenty-eight, and until others shall be chosen; and that the major part of said directors shall form a board for the transaction of business.

3. *And be it further enacted*, That if at any time it should happen, that an election of directors should not be made on the day when, pursuant to this act, it ought to have been made, the said corporation shall not for that cause, or for any non-user, be deemed to be dissolved, but that it shall and may be lawful, on any other day, to hold an election of directors.

4. *And be it further enacted*, That the said corporation shall have full right, power and authority to cut, construct and make a canal, in the twelfth ward of the city of New-York, from Spitendeuvel creek to Harlæm river, from and to such points and places as the said directors shall deem most expedient and advantageous; and such number of basins, connected therewith, as may be necessary; and to improve the navigation of Harlæm river, so as to afford to vessels, boats and other freighting craft, which shall traverse the land, canal and river, a secure and easy navigation from the said Spitendeuvel creek to and along the Harlæm river into the East river; and it shall also be lawful for the said corporation to invest such sums as they may deem expedient, in the building, purchase and employment of steam or other freighting boats, to be used in navigating the said canal and Harlæm river, and the waters adjacent, and therewith connected; and also to purchase, build or hire houses, factories, ware-houses, wharves and other necessary buildings for the use of said corporation, and to sell or lease the whole or any part of the above mentioned property as they may think conducive to the interests of the said incorporation: *Provided*, That the said company shall not take any land against the consent of the owner or owners, and shall not break ground in the excavation of the said canal or canals, or basins, without the approbation of the Corporation of the city of New-York, first had and obtained under their corporate seal.

5. *And be it further enacted*, That the capital stock of the said company shall be five hundred thousand dollars, to be divided into shares of fifty dollars each; and that it shall be lawful for the directors to call and demand from the stockholders respectively, all such sums of money by them subscribed, at such time and in such proportion, as they shall see fit; and that Richard Riker, Elisha W. King and Charles H. Hall shall be commissioners, for opening books and receiving subscriptions to said stock; and shall give thirty days notice of the time and place of holding such subscription; and that in case of the death or refusal to act, of any or either of the said commissioners, that the directors for the time being, shall and may appoint any one or more persons, as commissioners to supply the vacancy or vacancies occasioned by such death or refusal to act as aforesaid; and that if any stockholder or stockholders, so subscribing, shall neglect to make such payment as the said directors, on public notice of thirty days, may call for and demand, for ten days after the

same ought to have been paid, the shares of the said stockholders, so neglecting, and all previous payments by them made, may be forfeited to the use and benefit of the said corporation hereby created.

6. *And be it further enacted*, That the directors for the time being, shall have power to make such by-laws, rules and regulations as shall appear needful and proper, touching the management and disposition of the stock, property, estate and effects of the said corporation, the rate and manner of collecting tolls and fares, with power to appoint such and so many officers, clerks and servants for carrying on the business of the said corporation, and such allowances and salaries as to them shall seem meet and proper.

7. *And be it further enacted*, That if any person or persons shall wilfully do or cause to be done any act whatsoever, whereby the said canal, basins and works, or any matter or thing appertaining to the same, shall be impaired or injured, the person or persons so offending shall forfeit and pay to the said company treble the amount of damages sustained by means of such offence or injury, to be recovered by said company, with costs of suit, and by action of debt, in the supreme court of judicature of this State, which action shall, in every instance, be considered transitory in its nature, and may be triable in any county of this State.

8. *And be it further enacted*, That it shall not be lawful for the said corporation to employ any part of its capital in banking, nor shall it issue any bond, bill, note of credit, check, draft, or other obligation for the purpose of loaning the same; nor shall it use any power not expressly granted by this act, or any power not necessary to affect the object of the incorporation; and that any violation of this section shall be deemed a forfeiture of the privileges and rights of such corporation.

9. *And be it further enacted*, That the stock of said corporation shall be deemed and considered personal estate, and shall be assignable and transferable, and that no transfer of such stock shall be valid until the same shall have been duly assigned and transferred in and upon a book to be kept for that purpose, by the president of said corporation, which book shall be closed ten days previous to every election, and no transfer of stock shall entitle the person to election, unless the same shall have been transferred at least ten days previous to any such election.

10. *And be it further enacted*, That this act shall be deemed a public act; and shall be benignly and favorably construed for all the purposes therein declared and expressed, in all courts and places whatsoever.

11. *And be it further enacted*, That the term of two years from the passing of this act be, and it is hereby allowed for constructing said canal, and no more; and should said canal not be made within said period, then this act shall be deemed to have expired, and to be void to all intents and purposes.

12. *And be it further enacted*, That the stockholders shall jointly and severally be liable for the debts and demands against the said company, to the amount of the stock held by each stockholder: *Provided*, That no suit shall be brought against any stockholder or stockholders until thirty days after such debt or demand shall have been demanded from the said corporation.

13. *And be it further enacted*, That the Legislature may, at any time, alter or amend this act.

AN ACT TO AMEND AND EXTEND THE ACT ENTITLED "AN ACT TO INCORPORATE THE HARLÆM RIVER CANAL COMPANY." PASSED APRIL 16, 1827,

Passed May 13, 1836.

The People of the State of New-York represented in Senate and Assembly, do enact as follows:

§ 1. The act entitled "An act to incorporate the Harlæm River Canal Company," passed 16th April 1827, is hereby revived and continued and the time limited by said act for constructing said canal shall be extended to the term of five years from the passing of this act.

§ 2. Charles Henry Hall, Francis Fickett, Richard Riker, William Beach Lawrence, Lewis Morris, James R. Whiting, J. Green Pearson, Isaac Adriance, Jonathan B. Hall, Joseph G. Swift, Benson McGowan, Benjamin F. Carman, and Joseph E. Bloomfield, shall be the first directors, and shall hold their offices until the fourth Monday in April one thousand eight hundred and thirty-seven, and until others shall be chosen.

§ 3. The company are hereby authorised to extend their capital to the sum of seven hundred and fifty thousand dollars.

§ 4. Section twelfth of the former act is hereby repealed; but the said corporation shall not purchase, hold, or possess docks, wharves, ware-houses, or any other real estate exceeding in amount the sum of two hundred thousand dollars.

§ 5. Every thing in the act hereby revived, inconsistent with the provisions of this act, is hereby repealed.

§ 6. But persons residing upon, or owning lands bounded upon Harlæm River, or Spitendeuvel Creek, shall at all times have the liberty of passing through the locks or works of said company, with their ordinary farm boats, to and from New-York market, or pleasure boats, free from toll or other charges.

§ 7. This corporation shall continue for fifty years, and the Legislature may at any time alter and amend this act.

STATE OF NEW-YORK,
Secretary's Office.

I have compared the preceding with an original act of the Legislature on file in this office, and do certify that the same is a correct transcript therefrom, and of the whole of said original.

ARCH'D. CAMPBELL,
Dep. Secretary.

Albany, May 13, 1836.

DR. URE'S PATENT CORRUGATED SUGAR-PAN OR TEACHE.

The pan is made of cast-iron, and is double. Between the outer case, which is evenly, and the inner one which is corrugated into a double surface, there is a space for containing a liquid medium, which is unalterable by the fire in any length of time, and serves as a bath to transmit a sufficient heat to boil the syrup very quickly, but intercepts the scorching temperature which turns it into molasses. The sugar, therefore, cannot be burned in the inner pan, and the fire need never be extinguished, as at present, when a skip is struck. Thus, much time, labor, and fuel, are saved. The pan may be set up by any bricklayer, at the end of the ordinary range of coppers in a colonial sugar-house, where the finishing teache now stands; or it may be worked by a separate fire at the pleasure of the planter, and may have the spare heat of its flue applied to the clarifier-coppers.

Fig. 1 is a section of the double pan Being as tight as a bottle, and without seams or joints it is not liable to leak, like pans made of copper, which must be riveted or brazed. G is the vacant space between the two pans for the play of the bath-liquor during the time of skipping, when no evaporation is going on in the inner pan. H shows the level of the bath-liquor about two-thirds up the side corrugations. A is a bent pipe, three inches wide, for connecting the space between the pans, with an iron drum D, called the condenser. Any watery vapor which may occasionally exhale from the bath, when overforced by fire, rises freely up the pipe A, and is condensed into water in D. The water thus condensed is quite pure, and is allowed to trickle slowly down through the stopcock F into the funnel beneath it, from which it runs back into the bottom of the medium through the pipe B, and thus preserves the boiling pitch of the medium always at the requisite temperature. The best heat of the medium for boilng sugar quickly without discoloration has been found to be from 300 to 310 degrees of Fahrenheit's thermometer, but it may vary a few degrees up or down without inconvenience. The temperature of the bath may be made higher or lower, at the pleasure of the boiler. By merely preventing some of the water that exhales into the condenser D from returning into the bottom of the bath, the temperature is raised; and by pouring slowly a little more water into the bath through the pipe B, the temperature is lowered. A few quarts of water added make a difference of several degrees in the heat of the bath. E is a light basin of cast iron inverted over the open top of the safety-pipe of the drum D. The edges of the basin rest on 3 iron props, and dip an inch deep, or thereby, into some water poured round them, in the upper space of the drum. This arrangement forms a water-valve, which allows air or steam to pass freely to and from the bath space between the pans, but at the same time cuts off the open communication between the external atmosphere and the bath liquor. This liquor consists of a strong solution of caustic potash, and may be preserved any number of years in a perfect state for sugar-boiling, by this plan of seclusion from the open air. Should the body of medium after a long time absorb so much carbonic acid or fixed air, as to impair its action as a bath, it may be easily made caustic again, and thus restored to its original state, by boiling it for half an hour in a copper with half a hundred weight of fresh slaked quick lime, and six times its bulk of water. This lime-mixture being allowed to settle a night in the large copper in which it was boiled, must be ladled off into smaller copper in successive portions, and boiled down till its boiling pitch rises to 290 degrees, or thereby. The copper should be partially covered with boards during this boiling up, and whenever the liquor is concentrated enough, the copper should be closely covered with boards or mats, till th

Fig. 1.

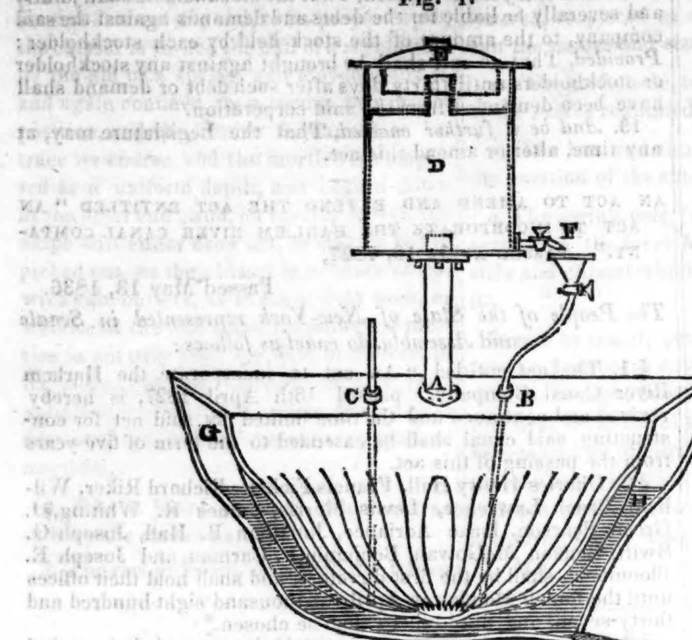


Fig. 2.

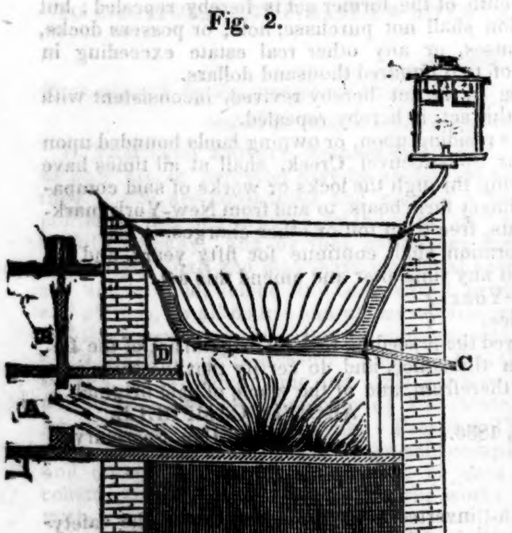
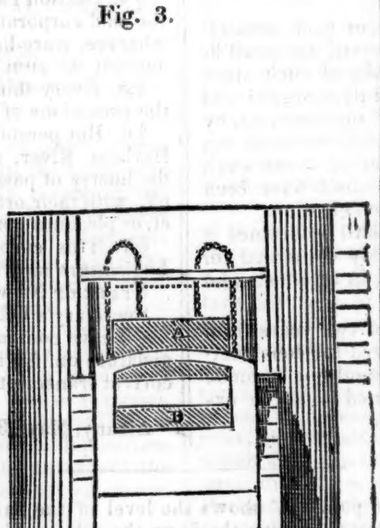


Fig. 3.



liquor has become cool enough to be poured into the bath space through the aperture at C or B (unscrewed for this purpose,) by means of a funnel, or a stone pitcher with a spout.

The flange A, of the bent pipe, is made water-tight to the brim of a pan by a lead-washer, and is fixed down firmly with screw bolts, having square heads. The funnel-pipe B, with the lengthening piece for introducing water into the bottom of the medium for regulating the temperature of the bath, is fixed in its place by a union-joint screw turned by a screw-key or wrench. The thermometer tube-case has a flange, with lead-washer at C, by which it may be screwed tight into its aperture. Into this tube which is shut bottom, an inch or two of quick silver is to be poured, or sufficient for covering the bulb of the thermometer. This quick silver lying always in the tube, takes the temperature of the medium, and immediately imparts it to the thermometer, on dipping its open end down into the bottom of the quicksilver. The thermometer, after some experience in boiling with the pan, need only be used occasionally, as in the morning and afternoon. It shows at once, whether the bath is too hot or too cool, so that a little water may be poured into it through B in the former case, or a little of the condensed water in D, allowed to run to waste, by the stop cock in F, in the second case.

The condensing-drum D, must be propped in its proper position, while its being fixed on to the brim of the pan by the screw-bolts of the flange A. When the pan is briskly at work, both stop-cocks for regulating the medium may be shut, and slightly opened only when the pan is charged afresh with syrup; or the stop cocks after a little practice, may both be left always slightly opened, whereby the pan will become self-acting, by the circulation of a little vapor into the condenser, and a return of it in the state of water to the bottom of the bath. Water poured on the *surface* of the dense medium does not incorporate with it, and therefore has little or no effect upon its temperature.

Fig. 2 is a section of the patent pan when set as the first of the range. A is the flue leading to the other pans. B B, the shuttle-valve, or dampers of fire-brick, by means of which the orifice of the flue may be lowered when required; thereby allowing the flame to have less contact with the bottom of the patent pan. C is the medium discharge-pipe, to be made use of only on finishing crop, when the medium ought to be run off into an iron drum, where it would remain free from the influence of the atmosphere till the following season. D D represents the circle of fire-bricks upon which the patent pan is seated.]

Fig. 3 represents more clearly the action of the dampers, as previously shown. These are placed betwixt the patent pan and the second of the range. A and B are the two dampers, equal in weight, and consequently of easy adjustment. When the dampers are furthest apart, the patent pan is receiving the full influence of the fire, but as they approach each other the flame is sucked more rapidly through the diminished orifice, and is in consequence allowed less contact with the bottom of the patent pan.

By these means the fierceness of the fire, as applicable to the patent pan, may be completely controlled, without the least waste of fuel; for while little of the heat is acting upon the patent pan, more is made available to the other pans of the range.

The medium is carefully prepared under the superintendence of the patentee, in a laboratory fitted up on purpose, and is sent out in a state ready for use, in an iron drum-tank, packed in a cask. The orifice of the tank is closed with a screwed iron plug, having a lead-washer under its flange. On taking out this plug with a common screw-wrench, the medium must be poured by portions into a stone or metal pitcher, and thence into the bath-space between the pans; the discharge-hole at the bottom of the pan having been previously closed tightly with its screwed pipe, and flange with lead-washer. At the other end of this short pipe there is a stop-cock, which is never to be opened but when the bath-liquor is to be drawn off at any vacant period, for the purpose of making it caustic again after some years' use. This stop-cock should in general be incased in brick-work or mortar, to screen it from idle fingers. The bath-liquor is corrosive to skin and wood and should not be put into wooden vessels or much handled; if a little happens to touch the fingers, it may be washed away with a little water. Should some of the medium be found to be congealed, the bottom of the open tank may be plunged in boiling water for a little, or surrounded with blazing cane-trash, and half a gallon of hot water may be poured in to wash out the remainder.

Should the junction of the outer and inner pans, at their brims above, become in the least open at any time, they may be made secure again, by packing them with iron cement, made of ground iron borings sal-ammoniacs, well mixed, in the proportion of six pounds of the former to one ounce of the latter, and very slightly damped with water.

When fire is first applied to the pan, after the proper charge of medium has been introduced into it, the progressive heating of the bath must be carefully observed by means of the thermometer, standing in the quicksilver tube C. If the temperature rises to 290 degrees, or thereby, the pan is ready without discoloration. A charge of such syrup may be boiled off into good sugar, by the patent teache, in half an hour, and into fine syrup for shipment home, in half that time. At the instant of running off the granulating skip into the cooler, the firing should be suspended, and resumed as soon as the fresh charge of syrup is introduced. The pans have a shelving brim, to which the usual sloping saddle of lead or mortar

cement may be most conveniently adapted, for allowing the juice to froth up without boiling over. The bath is a constant magazine of heat, by which the hot syrup is made to boil briskly immediately after its introduction, so that not an instant is lost in the operation of a sugar house. This pan is also more easily managed than the simple teache, as it cannot by possibility burn the juice, the fierceness of the fire merely agitating the bath for a little, without affecting the quality of the sugar. When there is no syrup in the corrugated pan, the medium should not be forced with a strong fire, as having no evaporable liquor to transfer its heat to, it might possibly boil up a little into the condenser. Even in this case no evil could result, since the moment that the fire becomes moderate, or that fresh syrup is put into the inner pan, the drop of medium which may have been forced up into the condenser D, can be run back into its proper place, through the stop-cock F, and subjacent funnel-pipe.

For some time after beginning to use the pan, it is proper to look every two or three days into the state of the bath, and to measure the depth at which it stands. This is conveniently done, at any interval of the boiling, by unscrewing the quicksilver pipe C, lifting it perpendicularly up, and noting how high the wet mark of the medium is. If it corresponds with about the middle height of the side corrugations, all is right; if it shows the medium to stand lower, a few gallons may be poured in from the spare tank. Too much medium is not advisable, as it merely heats the sides of the pan above the level of the granulated skip, and as it leaves too little space for the free play of the medium exposed to a fierce and fluctuating fire.

From the London Mechanics' Magazine.

ON THE STATE OF THE ARTS OF DESIGN IN ENGLAND, WITH A POSTSCRIPT ON TAXIDERMY AND TRAVERTINO.

Sir,—Upon reading your judicious testimony before the Committee of the House of Commons on Arts and Manufactures, I was struck with a passage (p. 189, 642d No.) wherein you most appositely remark on the "wretched prints," and "still more wretched stucco images," with which this country is inundated by the itinerant *Italian* hawkers. A great portion of the plaister of Paris casts are good, and in good taste; but the prints are all, without exception, the most wretched that it is possible to conceive it possible to execute. Many of the plaister casts, too, are as bad as the prints; and your remarks on this head brought to my recollection a circumstance which tallies most opportunely with them.

Some ten years ago, walking in the country in company with a gentleman of extensive knowledge, and the most correct taste, we met an Italian lad bearing his board of images, most of which were of that horrible sort of rubbish most prized in country places—all daubed with paint, red, yellow, blue, and black. My friend asked the Italian how he could possibly think of selling such *ugly* things, and how he could look on them without being sick? The Italian's reply exactly tallied with that which you, Mr. Editor, gave to the Committee:—"No doubt they consulted the taste of their customers." He said, "*Ugly*, do you say? Yes, they are ugly; but some people's do like them for to be ugly!" and added, in Italian, "*In Londra, possiamo vendere le cose regolare; ma in campagna, 'ci vuole il colorato e barbaresco.*"—"In London we can sell the *regular* things; but here (in the country,) we must have the colored and barbarous." By-the-bye, I will remark, that the Italian did not mean to attach the epithet of "barbarous" to the colored, merely as colored; though I do not mean to say that he was actually aware of the fact of the ancients, both Greeks and Romans, painting the statues of their gods and goddesses to the natural hues, and clothing them in garments according to the most approved fashion of the day.

I should think that there can be little doubt but that the contemplation of, and the drawing from, good statues or casts, is far more efficacious in infusing a right knowledge of design ino the student, as well as good taste and judgment in the public, than engravings, drawings, or paintings, can possibly be. I mean, that *cæteris paribus*, the diffusion of good statues or casts will have a far greater effect in a community than an equal diffusion of engravings and paintings. The *facilities*, however, which occur in the dissemination of the latter, through the innumerable publications which are now accompanied by wood cuts or superior engravings, must give it the lead in the power of general instruction to a community.

Speaking of castings in plaster of Paris, I will mention a circumstance which, I dare say most of your readers will feel aware of, which is, the very imperfect representations of fishes exhibited in museums and collections of natural history, when the stuffed skins of the animals are given as something like unto the originals. When we look upon the stuffed and varnished skin of fishes we have never seen alive or dead, the faults in the representation do not strike us; but let any one look at the preserved specimens of cod, soles, salmon, pike, trout, &c., with the very *phisiognomy* of which he is quite familiar, and he will surely require the aid of the name affixed to the specimen in order to recognise his old acquaintance! Not one of the stuffed fishes of the collections bear any greater resemblance to the real animals, than a stocking stuffed with hay or wool would have any anatomical resemblance to the leg of a human being! The transformations of the stuffer are truly ludicrous. But it is not his fault; it is the *process*, which is entirely inadequate to the purpose. Birds, and some animals with long hair, such as bears, &c., may be tolerably well represented through the art of stuffing, &c. But has any one seen a stuffed horse? I have, at Paris and elsewhere; and, unfortunately, our eyes are so familiar to the "noble presence," and to every beautiful swell and turn of the limbs and muscles of that noble animal, that the specimens I allude to, although executed by the first artists of the line in the world, might almost be mistaken for apes, or even cows, but for want of the ears and horns! But I am too prolix in the introduction of the trifle I have to present to such of your readers as are fond of fish and fishing, which has been my only diversion for many years. I have been in the habit of catching pike of 10, 12, and 20 lbs. weight; trout of 7, 10, and 11 lbs.; and in Italy, fish of much larger size. I was for some time in the habit of preserving a drawing of the best fish, by laying them on paper and taking the outline, an exact fac-simile as far as that went. I then attempted to stuff some of them, but succeeded no better than the gentlemen of the museums. I then thought of taking a cast in plaster of Paris of the fish, which I executed in more ways than one, all equally satisfactory. First, I took a cast of the fish, and then saturated it with linseed oil, and painted it from nature, so as to be, to all intents and purposes, a fac-simile. Secondly, I skinned the fish, took a cast, and then drew the skin over the cast. Thirdly, I made the cast from the unskinned fish, then skinned it, and drew the skin over the cast. The only difficulty I had was with the skin of the head, but that is of no consequence, and it might be overcome after three days' application. But by painting the cast the most perfect fac-simile is produced, both in form and color; and the latter will not be liable to the changes and blackening which occurs to the varnished skins of fishes.

I fear that you will accuse me of occupying your valuable columns with much trivial matter; but as far as the preservation, or rather *representation*, of fishes and reptiles is worthy of consideration, I think that the "preservers" will be benefitted by this communication.

Another word or two on a subject connected with the preservation of stone and roofs, &c. The stone of which the Church of St. Peter's, at Rome, is constructed, is a calcareous, stalictitious stone, called Travertino, formed by an agglomeration of bushes, leaves, roots, and some shells, by means of a calcareous fluid by which the whole is fossilised. The very process of this formation may be observed in all its various stages of progression and completion, on the road to Tivoli, about twelve miles from Rome. This is an interesting topic, but I must only allude to it in order to introduce the Travertino, which I have to represent as rather liable to honeycombs. These honeycombs when they occurred in the surface of any of the steps, copings, terraces, &c., on the vast surface of the top of St. Peter's Church, were usually filled with melted pitch or some kind of cement; but the great heat of the sun, combined with the action of the air and water, soon melted, decomposed, and dissipated these fillings in. In 1804, I recommended the application of melted sulphur into al, honeycombs, cracks, crevices, and junctions in the stone or clinkers, which constitute the top and pavements of St. Peter's Church which, in extent and appearance, is very much like a small town or fortress. The sulphur was universally applied; and up to 1815, I had frequent ocular proofs that it was no more affected by the sun or atmosphere, than would have been so much pure gold. To this, I will only add, that from subsequent experiments I have found, that by the addition to the sulphur of a small quantity of iron filings, a very hard sulphuret of iron, or artificial pyrites is produced. Copper, or brass filings would probably produce an analogous result.

I have read, with very great satisfaction, in your last number, Mr. Thomas S. Mackintosh's Electrical Theory of the Universe, to which I take the liberty of soliciting the particular attention of your philosophical readers. I shall venture to offer some remarks upon it next week. Meantime, I have the honor to be, Sir, your obedient servant,

F. Maceroni.

From the following article, we are much pleased to find that the Champlain and St. Lawrence Railroad promises to answer all expectations. Mr. Casey deserves great credit, for having erected a work as yet uninjured—having stood the test of one of the severest winters that may ever be expected.

No one, unless acquainted with the nature of the ground, can form any conception of the severe stress upon the pins and other work at the termination of the road.

The inexperience of the Canadian people in such matters, is an impediment of no small consequence, unknown, of course, in the United States.

We wish Mr. Casey equal success in all his works, though we cannot but feel jealous that our Canadian neighbors should secure to themselves so promising a member of the profession.

From the Report, in this day's paper, of the Committee of Management of the Champlain and St. Lawrence Railroad Company, it will be seen that every thing connected with that undertaking is in a highly forward and promising state, and that there is every prospect of the Railway being in operation in July. We think, with our contemporary the *Gazette*, that "the opening of the Railway will be one of the proudest days in the annals of Lower Canadian improvement."—[Morning Courier.]

At a meeting of the Stockholders of the Champlain and St. Lawrence Railroad Company, held on Monday last, the following Report of the proceedings since the last half yearly meeting, was submitted, approved, and ordered to be printed :—

The Committee of Management of the Champlain and St. Lawrence Railroad, beg to submit to the Stockholders of the Company a Report of the progress of the undertaking, since they had the honor of addressing them on the 14th of December last.

Shortly after the period just mentioned, contracts were entered into by the Commissioners of the Company, for preparing all the materials required for the superstructure of the Road, and also for the distribution of the same, when completed, together with the iron along the line of road, and we are happy to state that notwithstanding the unfavorable weather for such work during the past winter, the Commissioner reports that these several contracts have all been regularly fulfilled, and the various materials for completing the road now lie along the line, ready prepared to be put down thereon.

Contracts were entered into with the Messrs. Wards, early in the winter, for the completing of twelve, and the castings of eight freight cars, together with a variety of castings of iron works for *turn-outs*, splicing plates, &c. &c., all of which are rapidly progressing, (the splicing plates being completed, and in a great measure distributed along the line.)

A locomotive ordered in September last, and made by Stephenson of Liverpool, who ranks among the first in this department of engineering, was to be shipped, say our correspondents, about the end of March, and may be expected among the first vessels; the Company have been most fortunate in the seasonable execution of this order, as well as in that for the iron, which the present high price of that material will clearly testify.

The superior style in which passenger cars are got up in the city of Troy, in the United States, together with the inexperience of the mechanics in this city in the construction of such carriages, induced the Committee to send the Engineer of the Company, Mr. Casey, to Troy in January last, who entered into contracts with Messrs. Eaton & Robertson for two, twenty-four passenger cars, and with Messrs. Eaton & Gilbert for two, sixteen ditto, *complete for the road*, and which by late accounts from that place are being finished in a style of elegance worthy of the establishments from which they will emanate, and no doubt with the view of extending their high reputation to this country.

It is most gratifying to state, that the wharf at Laprairie, after undergoing an ordeal of no ordinary nature, remains uninjured in the slightest degree, thus justifying the high terms of commendation made use of in the Report which we had the honor to submit at the last half-yearly meeting.

The work upon the station house at Laprairie, was recommended on the 13th April, and completed, as far as practicable for the present, on the 3d instant. The work also upon the station house at St. John's, is now rapidly progressing.

The state of the graduation of the road is matter of much congratulation to the stockholders, for our Engineer reports, and we use his own words. "That the admirable state of the banks will not only facilitate all our operations this year, but is a guarantee that the superstructure will hereafter suffer little, if any, derangement from the frost. All streams and discharges have been uncommonly high this year, and two or three small culverts will be added to aid the passage of the water across the road,—this is all the extra work required." The Engineer also states, that about 1200 feet of the timber superstructure has been laid down ready to receive the iron, and that the workmen employed in this branch improve daily in expertness.

We have much pleasure in stating, that the steamboat building by Mr. Lindsay, to run in connexion with the Railroad, will be ready to launch in a day or two, and as the contract with the Messrs. Wards for the engine was entered into as early as the 1st December last, there is every reason to suppose the boat will be ready to take her station upon the ferry about the 10th July.

It now only remains for us to state, that the reports of the Engineer and Commissioner are such as confidently lead us to expect, that with favorable weather the road may be opened from station house to station house about the 15th July next, and that there is still every reason to suppose the estimate set forth in the Engineer's report of December last, will vary but little from the sum necessary to accomplish this desirable result.

PETER M'GILL, *Chairman.*

THE NEW SAFETY CAB.

We extract the following clear and sensible exposition of the advantages of this new vehicle (the invention of Mr. Hansom—the architect of the Birmingham Town-hall, confessedly one of the finest architectural productions of modern times,) from the prospectus of a company which has been formed for promoting its introduction into the metropolis :—

"The very peculiar construction of this carriage secures advantages that men of science and of practical experience have long wished for, but which have never before been obtained. Instead of an axle going through from side to side of the carriage, Mr. Hansom uses a frame work so contrived, that, while fully able to sustain any shock to which it may be exposed, and admitting the use of wheels of any diameter, it allows the body to be placed at any distance, however small, from the ground.—By this contrivance, three most important objects are attained : namely—

"1st. *Absolute safety:* for the body is placed so low, and the frame work so arranged, as to render it impossible that the carriage should be upset in any direction whatever ; nor can a kicking, a rearing, of a stumbling horse place the passengers in danger.

2. *Great relief to the horse in peculiar situations:* for the centre of gravity of the load being placed below the centre of the wheels, the injurious pressure on the horse, in ascending and descending hills with a 2-wheel carriage of the common construction, is avoided; for in descending, the pressure on his back is entirely removed; while in ascending, a small and advantageous addition is made to it.

3. "*Considerable reduction of draught in all circumstances:* for wheels of larger diameter than usual may be employed, not only without prejudice to the other advantages of the invention, but in promotion of them, and it is on all hands agreed, that very great saving of draught might be effecta by the use of large wheels, but for the hitherto supposed impossibility of reconciling them with the other necessary properties and conveniences of a carriage.

* * * *

"The inconvenience and danger of the present cabs have been long, loudly and justly complained of. The new cab is perfectly and obviously safe, and effectually protects passengers from injury by a vicious or stumbling horse ; it affords ingress and egress as safe and easy as those of a sedan-chair, and is smoother of motion than many of the best carriages of other kinds ; it also combines the shelter and comfort of a close carriage, with the lightness of an open one, and the speed of the best of the present cabs, at the cost of perhaps one-third less labor to the horse, and with the entire avoidance of the injurious effect of common 2-wheel carriages on hilly roads.

* * * * * * *

"In ascents and descents, any moderate degree of safety to the passenger, or of pressure on the horse, has been, hitherto, attainable only by the use of four wheels. Where four are used, they cannot be large : much power is thus lost—to say nothing of the additional friction—and two horses are needed. Absolute safety, and greater comfort to the passengers, and much greater ease to the animal, are now secured by two wheels, and those large ones. The additional horse is thus dispensed with, and posting may be done by one horse, on terms and with a convenience and rapidity yet unaccomplished. The conveyance of mails and despatches may be done by 2-horse carriages, with the like, or even greater, benefit.

"A carriage has recently been built, and is ready for public inspection and trial, which exemplifies the plan, and fully justifies the preceding observations. It has been subjected to severe trials, both intentionally and by accident; and by coming out of them without the slightest failure, has proved that its framework may be safely relied on in any emergency."

☞ Business on the Chemung Canal has opened this spring with vigor. Several boats have already departed laden with produce and lumber for the great emporium. There is more than twice as much lumber now on its banks as there was last year.—No damage has been done to the canal by the spring freshet.—[Elmira Republican.]

Somerville, (N. J.,) Railroad.— The most difficult part of the grading of this road between the town and the Point, has been completed. The contractors experienced a little difficulty a short time since from a strike among their hands; this difficulty was only for a day, the laborers returned to their work without any augmentation of their wages. There are but few difficulties to be encountered in grading the road between the town and the Point. The part about midway between the two Points is low and marshy, and as there are no abrupt inequalities to be encountered, the filling up can be accomplished without much cost. From the town to Somerville, the road has not yet been located, although several routes have been run. In addition to these favorable circumstances, it is said that 220 miles of the New-York and Erie Railroad will be put under contract this summer. The Point begins to present an appearance which will warrant us in the conclusion that its improvement is not the fanciful dream of a few speculators. Those grounds at the Point, which swell so nobly from the Sound, present to the eye of a close observer one of the finest locations which can be imagined for the erection of a commercial and manufacturing city. Laborers are now at work driving the posts for the building of a dock for the accommodation of the company.—[Elizabethtown Journal.]

Cost of the Railroad to the West.— Our attention has been turned to this subject by an article in the Wheeling Gazette, received to-day, which we copy below. The opinion expressed by the experienced engineer of the Baltimore and Ohio Railroad, as to the probable cost of that portion of the road which will extend from Cumberland to Wheeling—a distance of 132 miles—may be safely relied on as a tolerably correct criterion for an approximate estimate of the cost of the road from Harper's Ferry, by way of Hagerstown, to Cumberland, which is about half the distance. The estimate would then be as follows—

From Wheeling to Cumberland,	4,202,000
From Cumberland to H.'s Ferry,	2,101,000
Branch to Pittsburgh, 50 miles,	935,000
	$7,238,000

And the whole cost would be seven millions, two hundred and thirty-eight thousand dollars.

To meet the above estimate, the city of Baltimore has made provision to furnish three millions—the cities of Pittsburgh and Wheeling will each furnish one million, and if the legislature of Maryland shall subscribe three millions, it will amount in the whole to eight millions; which will furnish a surplus above the estimate, of $762,000, for moving power and contingencies.—[N. Y. Gazette.]

Comparison of Speed.—A French scientific journal states, that the ordinary rate is per second:—

Of a man walking - - -	4 feet.
Of a good horse in harness -	12
Of a reindeer in a sledge on the ice	26
Of an English race horse -	43
Of a hare - - - - -	88
Of a good sailing ship - -	19
Of the wind - - - -	12
Of sound - - - -	1638
Of a 24 pounder, cannon ball	1800
Of the air, which, so divided, returns into space - -	1300

The number of passengers on the Birmingham and Gloucester Railway calculated upon, amounts to uparwds of 400,000, and the quantity of goods to about 70,000 tons annually. The amount of income expected to arrive from the conveyance of goods and passengers, is £145,855 5*s*. 1*d*. The estimated charge of the annual expenses of the railroad when completed is £52,000; and the cost of making the road, which is expected to be completed in four years, is £889,703. The engineering difficulties are considerable, in consequence of the country through which it has to pass. There are two inclined planes of upwards of a mile and a quarter each, to be passed by passengers, and another one at the termination of the line at Gloucester of 500 yards, to be used for goods only. The carriages are to be drawn up these inclined planes by means of stationary engines. There will also be one tunnel 440 yards in length.—[Ledger.]

The carriages running on that part of the Greenwich Railroad which is finished have been filled every day during the last week. The Company's receipts have been about 50*l*. a day. The form of the road appears advantageous for the carriages; and it is found that the two coats of cement and concrete which are laid over the whole of the brick-work of the arches is quite effectual in preventing any moisture from penetrating.—[Herald.]

On the 2d inst., a disastrous occurrence took place at the British Iron Company's Works at Aberyschen. The fly-wheel, propelling the machinery at the forge, is upwards of 20 feet diameter, and revolves upwards of 70 times a-minute. During this velocity and with but a momentary notice, it is supposed that one of the cogs of the wheel gave way, the whole of the attached wheels, etc., were hurled in an alarming momentum through the roof into the air, upwards of 300 feet, and one piece, weighing nearly two tons, descended within ten feet of the forge, and was buried a considerable depth in the ground; fortunately, although some persons were within two or three yards of the place where this huge mass of iron fell, and nearly 100 altogether in and about the works, not a single person was injured. The damage done to the works is estimated at 5,000l.—[Chronicle.]

A journeyman engraver has just made a discovery of much importance, for the economy caused by it in the manufacturing ef fire arms. The stocks of guns, that usually require much labour, are made quite miraculously by the aid of a machine which he has invented. Government, it is said, has bought the invention at the price of 300,000fr., and the inventor is immediately to set up machines of this kind in eoch of the arsenals.

NOTICE TO CONTRACTORS.

JAMES RIVER AND KANAWHA CANAL.

PROPOSALS will be received at the Office of the James River and Kanawha Company, in the City of Richmond, from the 15th to the 23rd day of August, for the construction of all the Excavation, Embankment and Walling not now under contract, together with nearly all the Culverts and the greater portion of the Locks between Lynchburg and Maidens' Adventure.

The work now advertised embraces the twenty miles between Columbia and the head of Maidens' Adventure Pond, the eight miles between Seven Island Falls and Scottsville, and about twenty isolated sections, reserved at the former letting, between Scottsville and Lynchburg.

The quantity of masonry offered is very great—consisting of about two hundred Culverts of from three to thirty feet span; nine Aqueducts, thirty-five Locks a number of Wastes, with several farm and road Bridges.

General plans and specifications of all the work, and special plans of the most important Culverts and Aqueducts, will be found at the offices of the several Principal Assistant Engineers on the line of the Canal.

The work will be prepared for examination by the 25th July; but mechanics, well recommended, desirous of immediate employment, can obtain contracts for the construction of a number of Culverts at private letting.

Persons offering to contract, who are unknown to the subscriber, or any of the Assistant Engineers, will be expected to accompany their proposals by the usual certificates of character and ability.

CHARLES ELLET, Jr.,
Chief Engineer of the James River and Kanawha Company.

NOTE.—The Dams, Guard-Locks, most of the Bridges, and a number of Locks and Culverts, are reserved for a future letting. Persons visiting the line for the purpose of obtaining work, would do well to call at the office of the Company in the city of Richmond, where any information which they may desire will be cheerfully communicated.

The valley of James River, between Lynchburg and Richmond, is healthy. C. E. Jr.

20—ta18

RAILROAD CAR WHEELS AND BOXES, AND OTHER RAILROAD CASTINGS.

Also, AXLES furnished and fitted to wheels complete at the Jefferson Cotton and Wool Machine Factory and Foundry, Paterson, N. J. All orders addressed to the subscribers at Paterson, or 60 Wall street, New-York, will be promptly attended to.

Also, CAR SPRINGS.

Also, Flange Tires, turned complete.

J8 ROGERS, KETCHUM & GROSVENOR.

ALBANY EAGLE AIR FURNACE AND MACHINE SHOP.

WILLIAM V. MANY manufactures to order, IRON CASTINGS for Gearing Mills and Factories of every description.

ALSO—Steam Engines and Railroad Castings of every description.

The collection of Patterns for Machinery, is not equalled in the United States. 9—1y

RAILWAY IRON.

95 tons of 1 inch by ½ inch.
200 do 1¼ do ½ do
40 do 1½ do ⅜ do
800 do 2 do ½ do
800 do 2¼ do ⅝ do
soon expected.

FLAT BARS in lengths of 14 to 15 feet, counter sunk holes, ends cut at an angle of 45 degrees, with splicing plates and nails to suit.

250 do. of Edge Rails of 36 lbs. per yard, with the requisite chairs, keys, and pins.

Wrought Iron Rims of 30, 33, and 36 inches diameter for Wheels of Railway Cars, and of 60 inches diameter for Locomotive Wheels.

Axles of 2½, 2¾, 2⅞, 3, 3¼, 3½, and 3¾ inches in diameter, for Railway Cars and Locomotives, of patent iron.

The above will be sold free of duty, to State Governments and Incorporated Governments, and the drawback taken in part payment.

A. & G. RALSTON,
9 South Front street, Philadelphia.

Models and samples of all the different kinds of Rails, Chairs, Pins, Wedges, Spikes, and Splicing Plates, in use both in this country and Great Britain, will be exhibited to those disposed to examine them.

4—d7 1meowr

SMITH & VALENTINE,

STEREOTYPE FOUNDERS,

Are prepared to execute orders in their line, at 212 Grand street, New-York.

FRAME BRIDGES.

THE subscriber would respectfully inform the public, and particularly Railroad and Bridge Corporations that he will build Frame Bridges, or vend the right to others to build, on Col. Long's Patent, throughout the United States, with few exceptions. The following sub-Agents have been engaged by the undersigned who will also attend to this business, viz.

Horace Childs,	Henniker, N. H.
Alexander McArthur,	Mount Morris, N. Y.
John Mahan,	do do
Thomas H. Cushing,	Dover, N. H.
Ira Blake,	Wakefield, N. H.
Amos Whitemore, Esq.,	Hancock, N. H.
Samuel Herrick,	Springfield, Vermont.
Simeon Herrick,	do do
Capt. Isaac Damon,	Northampton, Mass.
Lyman Kingsly,	do do
Elijah Halbert,	Waterloo, N. Y.
Joseph Hebard,	Dunkirk, N. Y.
Col. Sherman Peck,	Hudson, Ohio.
Andrew E. Turnbull,	Lower Sandusky, Ohio.
William J. Turnbull,	do do
Sabried Dodge, Esq., (Civil Engineer,)	Ohio.
Booz M. Atherton, Esq.	New-Philadelphia, Ohio.
Stephen Daniels,	Marietta, Ohio
John Rodgers,	Louisville, Kentucky.
John Tillson,	St. Francisville, Lous'a.
Capt. John Bottom,	Tonawanda, Penn.
Nehemiah Osborn,	Rochester, N. Y.

Bridges on the above plan are to be seen at the following localities, viz. On the main road leading from Baltimore to Washington, two miles from the former place. Across the Metawamkeag river on the Military road, in Maine. On the National road in Illinois, at sundry points. On the Baltimore and Susquehanna Rrailroad at three points. On the Hudson and Patterson Railroad, in two places. On the Boston and Worcester Railroad, at several points. On the Boston and Providence Railroad, at sundry points. Across the Contocook river at Hancock, N. H. Across the Connecticut river at Haverhill, N. H. Across the Contoocook river, at Henniker, N. H. Across the Souhegan river, at Milford, N. H. Across the Kennebec river, at Waterville, in the state of Maine.—Across the Genesse river, at Mount Morris, New-York, and several other bridges are now in progress.

The undersigned is about to fix his residence in Rochester, Monroe country, New-York, where he will promptly attend to orders in this line of business to any practicable extent in the United States, Maryland excepted.

MOSES LONG.
General Agent of Col. S. H. Long.

Rochester, May 22d, 1836. 19y-tf.

PATENT RAILROAD, SHIP AND BOAT SPIKES.

☞ The Troy Iron and Nail Factory keeps constantly for sale a very extensive assortment of Wrought Spikes and Nails, from 3 to 10 inches, manufactured by the subscriber's Patent Machinery, which after five years successful operation, and now almost universal use in the United States, (as well as England, where the subscriber obtained a patent,) are found superior to any ever offered in market.

Railroad Companies may be supplied with Spikes having countersink heads suitable to the holes in iron rails, to any amount and on short notice. Almost all the Railroads now in progress in the United States are fastened with Spikes made at the above named factory—for which purpose they are found invaluable, as their adhesion is more than double any common spikes made by the hammer.

*** All orders directed to the Agent, Troy, N. Y., will be punctually attended to.

HENRY BURDEN, Agent,
Troy, N. Y., July, 1831.

*** Spikes are kept for sale, at factory prices, by I. & J. Townsend, Albany, and the principal Iron Merchants in Albany and Troy; J. I. Brower, 222 Water street, New-York; A. M. Jones, Philadelphia; T. Janviers, Baltimore; Degrand & Smith, Boston.

P. S.—Railroad Companies would do well to forward their orders as early as practicable, as the subscriber is desirous of extending the manufacturing so as to keep pace with the daily increasing demand for his Spikes.

1J23am H. BURDEN.

ARCHIMEDES WORKS.

(100 North Moor street, N. Y.)

NEW-YORK, February 12th, 1836.

THE undersigned begs leave to inform the proprietors of Railroads that they are prepared to furnish all kinds of Machinery for Railroads, Locomotive Engines of any size, Car Wheels, such as are now in successful operation on the Camden and Amboy Railroad, none of which have failed—Castings of all kinds, Wheels, Axles, and Boxes, furnished at shortest notice.

4—ytf H. R. DUNHAM & CO.

CHICAGO LOTS.

NOTICE is hereby given, that on the 20th day of June next, at the Town of Chicago, in the State of Illinois, the following described Property will be sold at Public Auction, to wit:

All the unsold Town Lots in the original Town of Chicago; and also the Town Lots on fractional Section No. Fifteen, in the Township No. Thirty-nine, North of Range Fourteen, East of the Third principal Meridian adjoining the said Town of Chicago. The sale will commence on the said 20th day of June, and will be continued from day to day, until all the Property has been offered for sale or disposed of. This property is held by the State of Illinois for canal purposes, and is offered for sale in conformity to the provision of a Statute Law of the said State, authorizing such a sale. The terms of sale are one-fourth of the purchase money to be paid in advance at the time of sale, and the residue in three annual instalments, bearing an interest of six per centum per annum, payable annually in advance.

Those who are unacquainted with the situation of the above mentioned Property, are informed that those Lots which are described as belonging to the original Town of Chicago, are situated in the best built and business part of the Town. Section Fifteen is a dry ridge, commencing near the harhor, and extending south, one mile, along the shore of Lake Michigan.

By order of the Board of Commissioners of the Illinois and Michigan Canal.

Attest, JOEL MANNING,
Treasurer to said Board.

Chicago, March 17th, 1836. 13—8t

PROSPECTUS OF VOLUME II. OF THE CHICAGO AMERICAN,

TO BE PUBLISHED SEMI-WEEKLY.

In proposing to establish a SEMI-WEEKLY paper under the old title, but with extended dimensions, the subscriber acknowledges the favors of the past, and solicits the continued patronage of a liberal public.—The reasons that induced him about a year since to establish his weekly paper, operates with renewed and increasing force in favor of his present design.—He shall endeavor, as it was originally intended, to make his paper American in all things; and by identifying itself with the interests and circumstances of Chicago—which from a recent wildnerness has advanced to a population of thirty-five hundred—and of the rich, extensive, and rapidly developing country of which it is the emporium, he hopes it may "grow with their growth, and strengthen with their strength."

As a record of passing events, current literature, of the march of agriculture, commerce and manufactures, and especially of the progress of internal improvements, of which this State, by her recent passage of the act for the construction of the "Illinois and Michigan Canal," has commenced her great and auspicious system, it will aim, as ever, to be accurately and early informed, and thus endeavor to consult alike the tastes and wants of the community with which it is identified. With party, as generally understood, it will have as little to do as possible. Its politics will be the Constitution—its party, the Country.

With this brief explanation of its future course, and his thanks for the more than expected encouragement he has already received, the subscriber again ventures to solicit the continued patronage and extended support of all who may feel an interest in the principles here set forth.

It will be enlarged and otherwise greatly improved, and printed on superior paper, and forwarded to distant subscribers by the earliest mails, enveloped in a strong wrapper.

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*** Any person procuring five subscribers and remitting the pay in advance, will be entitled to a sixth copy gratis, or a deduction of TEN PER CENT.

Persons at a distance remitting a $5 bill will receive the paper fifteen months.

*** All sums to the amount of $10 and upwards may be sent through the Post Office, at my expense.

THOS. O. DAVIS.

Chicago, March 25, 1836.

*** Subscriptions and Advertisements for the CHICAGO AMERICAN will be received at the Office of the Railroad Journal, 132 Nassau street, by D. K. MINOR.

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